ORIGINAL

E000003242

Adam L. Stafford (025317)
WESTERN RESOURCE ADVOCATES
P.O. Box 30497
Phoenix, Arizona 85046
(602) 562-9903
Adam.Stafford@westernresources.org
Staff Attorney for Western Resource Advocates

BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS
BOB BURNS, Chairman
BOYD DUNN
SANDRA D. KENNEDY
JUSTIN OLSEN
LEA MÁRQUEZ PETERSON

IN THE MATTER OF THE APPLICATION OF TUCSON ELECTRIC POWER COMPANY FOR THE ESTABLISHMENT OF JUST AND REASONABLE RATES AND CHARGES DESIGNED TO REALIZE A REASONABLE RATE OF RETURN ON THE FAIR VALUE OF THE PROPERTIES OF TUCSON ELECTRIC POWER COMPANY DEVOTED TO ITS OPERATIONS THROUGHOUT THE STATE OF ARIZONA AND FOR RELATED APPROVALS	DOCKET NO. E-01933A-19-0028 **WESTERN RESOURCE ADVOCATES' NOTICE OF FILING DIRECT TESTIMONY**

Western Resource Advocates ("WRA") provides notice that it is filing the attached direct testimonies of Ms. Autumn Johnson, Mr. James Garren, and Mr. Michael Majoros as Exhibits 1-3, respectfully.

RESPECTFULLY SUBMITTED this 11th day of October, 2019.

WESTERN RESOURCE ADVOCATES

By */s/ Adam Stafford*
Adam L. Stafford
Staff Attorney for WRA

ACC - Docket Control - Received 10/11/2019 2:58 PM
ACC - Docket Control - Docketed 10/11/2019 3:18 PM

ORIGINAL e-Filed and eight (8) copies
of the foregoing delivered this 11th day of
October, 2019, with:

Docket Control
ARIZONA CORPORATION COMMISSION
1200 W. Washington Street
Phoenix, Arizona 85007

COPY of the foregoing emailed
this 11th day of October, 2019 to:

ARIZONA CORPORATION COMMISSION
Robin Mitchell, Director- Legal Division
LegalDiv@azcc.gov
utildivservicebyemail@azcc.gov

TUCSON ELECTRIC POWER COMPANY
docket@swlaw.com
bcarroll@tep.com
jthomes@swlaw.com
mpatten@swlaw.com
mdecorse@tep.com
mderstine@swlaw.com

Alex Dely
Vice Chairman
8522 E. Helen Pl.
Tucson, AZ 85715
DelyCIHF@hotmail.com

Brandon Cheshire
3810 W. Cochise Dr.
Phoenix, AZ 85051
brandon@sunharvest.com

Charles Wesselhoft
Pima County
32 N. Stone, 21st Fl.
Tucson, AZ 85701
Charles.Wesselhoft@pcao.pima.gov

Daniel Pozefsky
RUCO
1110 W. Washington, Ste. 220
Phoenix, AZ 85007
procedural@azruco.gov
dpozefsky@azruco.gov

Eric R. Hawkins
Durazzo, Eckel & Hawkins PLLC
45 N. Tucson Blvd.
Tucson, AZ 85716
eric@durazzo-eckel.com
kcathers@trico.coop
vnitido@trico.coop

Kurt J. Boehm
Boehm, Kurtz & Lowry
36 E. Seventh St., Ste 1510
Cincinnati, OH 45202
john@mooreinjurylaw.com
kboehm@bkllawfirm.com

Kyle J. Smith
United States Department of Defense
9275 Gunston Rd., Ste 1300
Fort Belvoir, VA 22060
Kyle.j.smith124.civ@mail.mil
Karen.white.13@us.af.mil

Lawrence V. Robertson, Jr.
210 Continental Rd., Ste 216A
Green Valley, AZ 85622
Greg.bass@calpinesolutions.com
Mary.lynch@constellations.com
Tubaclawyer@aol.com
George.waidelich@alberstons.com
Scott.olson@directenergy.com

Louisa Eberle
2101 Webster St., Ste. 1300
Oakland, CA 94612
Greg.wannier@sierraclub.org
Louisa.eberle@sierraclub.org

Melissa Kreuger
Pinnacle West Capital Corporation
400 N. 5th St.
MS 8695
Phoenix, AZ 85004
Thomas.Mumaw@pinnaclewest.com
Debra.Orr@aps.com
Melissa.Krueger@pinnaclewest.com
Theresa.Dwyer@pinnaclewest.com

Michael Patten
Snell & Wilmer LLP
400 E. Van Buren St.
Phoenix, AZ 85004
mderstine@swlaw.com
docket@swlaw.com
bcarroll@tep.com
jthomes@swlaw.com
mdecorse@tep.com
mpatten@swlaw.com

Michele Van Quathem
Law Offices of Michele Van Quathem PLLC
7600 N. 15th St., Ste. 150
Phoenix, AZ 85020
mvq@mvqlaw.com

Nicholas J. Enoch
Lubin & Enoch PC
349 N. 4th Avenue
Phoenix, AZ 85003
cristina@lubinandenoch.com
kaitlyn@lubinandenoch.com
nick@lubinandenoch.com
corey@lubinandenoch.com

Patrick J. Black
Fennemore Craig PC
2394 E. Camelback Rd., Ste. 600
Phoenix, AZ 85016
pblack@fclaw.com
lferrigni@fclaw.com
khiggins@energystrat.com

Roi I. Lusk
The City of Tucson
PO Box 27210
Tucson, AZ 85726
Roi.Lusk@tucsonaz.gov
Jennifer.Stash@tucsonaz.gov

Scott S. Wakefield
Hienton & Curry PLLC
5045 N. 12th St., Ste. 110
Phoenix, AZ 85014-3302
swakefield@hclawgroup.com
Stephen.Chriss@walmart.com

Thomas Loquvam
The Loquvam Law Firm
2198 E. Camelback Rd., Ste. 305
Phoenix, AZ 85016
thomas@loquvam.com
ArizonaEnergyPolicyGroup@gmail.com

Timothy M. Hogan
Arizona Center for Law In The Public Interest
514 W. Roosevelt St.
Phoenix, AZ 85003
thogan@aclpi.org
briana@votesolar.org
sandy.bahr@sierraclub.org
katie.chamberlain@sierraclub.org
janderson@aclpi.org
peter.morgan@sierrac1ub.org
sbatten@aclpi.org
Nhorseherder@gmail.com
cmassey@swenergy.org

mark@sanjuancitizens.org
carol.davis@dine-care.org
robyn.jackson@dine-care.org
schlegelj@aol.com
lori.goodman@dine-care.org
ezuckerman@swenergy.org

By: /s/ ML

EXHIBIT 1

DIRECT TESTIMONY OF AUTUMN JOHNSON

On Behalf of WRA

Docket No. E-01933A-19-0028

TABLE OF CONTENTS

I. INTRODUCTION

Q: WHAT IS YOUR NAME AND BUSINESS ADDRESS?

A: My name is Autumn Johnson. My business address is P.O. Box 30497, Phoenix, Arizona 85046.

Q: WITH WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A: I am an Energy Policy Analyst for Western Resource Advocates (WRA) in the Clean Energy Program. In that role, I advise on policy and other matters related to electric utilities and their resource development and operation, decarbonization of the electric grid, and electrification of transportation, primarily within Arizona.

Q: DESCRIBE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A: I hold a bachelor's degree (BA) from the University of Arizona. I also hold a law degree (JD) from the University of Oregon, where I focused on environmental law. I hold a Master of Business Administration (MBA) from Seattle University. Lastly, I am currently pursuing a Doctor of Philosophy (PhD) at Boise State University in Public Policy and Administration.

In addition to being an Energy Policy Analyst for WRA, I teach environmental law and policy at Concordia University School of Law. Before working for WRA, I was the Assistant Director of the Energy Policy Institute (EPI) at Boise State University, which is a think tank focused on clean energy research. Past EPI research includes work on utility scale solar siting, the economics of small modular reactors (SMRs), Regional Transmission Organization (RTO) expansion in the west, and nuclear waste storage, among other work. Within this role, I also participated on the Idaho Power Integrated Resource Plan (IRP) Advisory Council, attended Idaho Public Utility Commission (PUC) technical hearings, and attended conferences. Attachment A to this testimony is a copy of my resume, which more completely describes my background and education.

Q: IS THIS YOUR FIRST TESTIMONY BEFORE THE ARIZONA CORPORATION COMMISSION?

A: Yes.

II. PURPOSE OF TESTIMONY

Q: WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A: I am supporting WRA's recommended planned retirement dates for certain Tucson Electric Power (TEP) fossil fueled power plants. I am also introducing the other witnesses WRA is sponsoring in this rate case: Mr. Michael Majoros, Mr. James Gareen, and Mr. Brendon Baatz, who is co-sponsored with the Southwest Energy Efficiency Project (SWEEP). Mr. Majoros is President and CEO of SKM & Associates, a consulting firm specializing in depreciation, accounting, financial, and management issues. James Gareen is the Vice President of SKM & Associates. They are providing testimony to recommend particular depreciation schedules for TEP assets that would allow the company to incorporate WRA's recommendations for fossil fuel generation retirements without impacting customer rates. Mr. Baatz is Vice President of Gabel Associates, a consultancy focusing on energy, environmental, and public utility matters. He is providing testimony on cost recovery of energy efficiency investments and electrification of the transportation sector, among other topics.

My testimony is intended to highlight the policy implications of continued fossil fuel use by TEP and to recommend that TEP's retirement of its fossil fueled generation fleet be aligned with the scientific and policy goals and requirements, which TEP has acknowledged and will likely be subject to in the future. The Arizona Corporation Commission is currently considering modification of its Renewable Energy Standard and Tariff (REST) rules, neighboring states have announced increased renewable and clean energy standards, utilities all over the country have committed to decarbonization goals, and the three largest utilities in Arizona have publicly or privately committed to announcing their own decarbonization goals by April 2020, if they have not done so already. TEP is working with the University of Arizona to establish its own decarbonization goals.

III. SUMMARY OF RECOMMENDATIONS

Q: PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS.

A: TEP's proposed advancement of planned retirement dates of some of its thermal resources should be approved. Further, the Commission should reject TEP's proposal to extend the lives of its gas fired thermal resources beyond 2050. TEP's planned retirements for its natural gas plants should align with TEP's stated view of the future of fossil fueled generation.

Recent research suggests that the natural gas market is headed in a similar direction to coal and new or continued investment in natural gas plants introduces regulatory and economic risks that will likely be borne by customers.[1] Renewable energy and storage are now cost competitive with natural gas.[2] Shortening the expected service lives of TEP's thermal resources will help to ensure that these plants do not become stranded assets.

IV. TEP THERMAL UNITS' SERVICE LIVES

Q: HOW DOES TEP PROPOSE TO SHORTEN THE SERVICE LIVES OF ITS THERMAL PLANTS?

A: Mr. Sheehan proposes shortening the expected service lives for all units at Navajo Generating Station (NGS) and Springerville Generating Station (SGS), as well as three units at Sundt Generating Station (Sundt). TEP proposes shortening the depreciation life of NGS by 11 years from 2030 to 2019 and shortening the depreciation life of SGS by five years from 2045 to 2040 for Unit 1 and from 2050 to 2045 for Unit 2. TEP proposes

---

[1] *See* Rocky Mountain Institute's report, *The Growing Market for Clean Energy Portfolios and Prospects for Gas Pipelines in the Era of Clean Energy*, Sept. 9, 2019. https://rmi.org/a-bridge-backward-the-risky-economics-of-new-natural-gas-infrastructure-in-the-united-states/.

[2] WRA Comments filed on July 12, 2019, RU-00000A-18-0284. https://docket.images.azcc.gov/E000001787.pdf.

shortening the depreciation life of Sundt (Units 1, 2, and 4) by 8 to 11 years, depending on the unit, with the last to close in 2037 instead of 2048. To accomplish these shorter depreciable lives without an adverse rate impact, TEP proposes to extend the service life of its gas fired generation.

Q. HOW DOES TEP PROPOSE TO EXTEND THE EXPECTED SERVICE LIVES OF ITS GAS PLANTS?

A: TEP proposes to extend the life of the Gila River Power Station (Gila River) by 15 years, thereby moving its retirement date from 2048 to 2063. TEP also proposes to extend the life of the Luna Energy Facility by 15 years, thereby moving its retirement date from 2051 to 2066. TEP also proposes extending the life of Sundt's CTs (Units 1 and 2) by five years, thereby moving their retirement date from 2027 to 2032.

TEP also intends to purchase Gila River Unit 2 in 2019, with the same life span as the other Gila River Unit mentioned above. This would indicate TEP's intention to run Gila River Unit 2 until 2063. TEP is proposing a 45-year life cycle for its new RICE units.

Q. DO YOU SUPPORT TEP'S PROPOSAL TO EXTEND THE SERVICE LIVES OF ITS GAS PLANTS?

A: No. Using fossil fuel units so far into the future does not align with TEP's recent public statements, electric industry trends, or science-based climate goals. TEP has articulated a goal to decarbonize its system in compliance with the best available science in both their Preliminary Integrated Resource Plan (PIRP) and in public presentations at the Commission. TEP announced to the Commission at the September 19, 2019 IRP Workshop that it is working with the University of Arizona to establish its own, science-based decarbonization goals. This is in line with dozens of other utilities that have already announced decarbonization goals,[3] including Dominion, Entergy, NextEra, Xcel, Idaho Power, Avista, PNM, NV Energy, SRP, Southern Co., and Duke, among others.

---

[3] Ceres, *Climate Strategy Assessments for the US Electric Power Industry: 2019 Update*, Table 2, August 2019. https://www.ceres.org/sites/default/files/reports/2019-08/Ceres_ElecSectorClimateStratAssess_Update_081319.pdf.

These utility announcements are in addition to several states and over 100 cities.[4] These goals reflect an intention to stop using fossil fuels by mid-century.

While natural gas plants typically emit less greenhouse gases than coal plants, they are still carbon emitting resources. Depreciating and, potentially, running gas plants until the 2060s is inadvisable for rate payers and the environment. Recent research indicates that natural gas is going the way of coal. Due to falling prices for renewables and technological innovation in storage technology, gas may be uneconomical in the near future.[5] Therefore, extending the lives of these plants runs the risk of creating stranded assets.

Mr. Sheehan states that TEP needs to extend the lives of these plants because "there will be a need to maintain an adequate supply of backup thermal generation to support real-time grid operations," and that TEP "need[s] to maintain existing natural gas capacity as the Company reduces and eventually eliminates its reliance on coal-fired generation."[6] Given existing renewable and storage technology, as well as continued technological innovation, TEP should plan to also eliminate its reliance on natural gas by mid-century, and certainly sooner than 2066.

V. <u>RISKS TO CUSTOMERS</u>

Q: IS THERE A RISK TO CUSTOMERS OF DEPRECIATING THESE PLANTS AS RECOMMENDED?

A: No. The depreciation schedules we support strive to be rate neutral but will prepare TEP and its customers for a decarbonized future while mitigating the financial risk of stranded assets. Testimony from WRA's witnesses, Mr. Majoros and Mr. Garren, present one

---

[4] Sierra Club, *100% Commitments in Cities, Counties, and States*, https://www.sierraclub.org/ready-for-100/commitments.

[5] Rocky Mountain Institute's report, *The Growing Market for Clean Energy Portfolios and Prospects for Gas Pipelines in the Era of Clean Energy*, Sept. 9, 2019. https://rmi.org/a-bridge-backward-the-risky-economics-of-new-natural-gas-infrastructure-in-the-united-states/.

[6] Direct Testimony of Michael Sheehan, page 10, lines 9-12.

option for how TEP can depreciate its fossil fuel plants with no or minimal costs to customers and without extending the depreciable lives of its gas plants.

Q: DOES CLIMATE CHANGE POSE A RISK TO CUSTOMERS?

A: Yes. Climate change poses risks of increased temperatures, drought, and wildfires in Arizona.[7] Additionally, carbon emissions coincide with water and air quality problems.[8] Further, investments in fossil fuel plants that will not be paid off until 2066 create economic risks that may be passed on to customers as stranded assets. It is prudent for utilities, like TEP, to take note of changes within the industry. When other states, hundreds of cities, and dozens of utilities all over the country are announcing plans to decarbonize, that indicates a directional shift in energy sector practices and public policy, which affects customers.

VI. TEP CLIMATE CHANGE STATEMENTS

Q: HAS TEP RECOGNIZED THE TRENDS YOU IDENTIFY ABOVE AND MADE STATEMENTS RELATED TO CLIMATE CHANGE?

A: Yes. To its credit, TEP recognizes the need to transform its generation fleet to accommodate these trends and concerns. In TEP's PIRP, it states:

> Our commitment to serve the best interests of our current and future customers and stakeholders compels us to develop a revised goal focused on reducing carbon dioxide emissions. This new, more comprehensive goal, will be based on greenhouse gas reductions that reflect our proportional contribution toward limiting global temperatures to levels outlined in the 2015 Paris Agreement on climate change. To that end, we have enlisted the University of Arizona's Institute for the Environment to help us develop science-based targets that allow us to measure our steps toward a global solution. [9]

---

[7] Environmental Protection Agency, *What Climate Change Means for Arizona*, 2016, https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-az.pdf; Arizona Republic, *Study: Climate change could transform Arizona's forests, deserts, worsening drought and fire*, Sept. 1, 2018, https://www.azcentral.com/story/news/local/arizona-environment/2018/09/01/climate-change-could-transform-arizona-forests-deserts-environment-study/1148294002/.

[8] WRA Comments filed on July 12, 2019, RU-00000A-18-0284, https://docket.images.azcc.gov/E000001787.pdf.

[9] TEP PIRP, page 3, https://www.tep.com/wp-content/uploads/2019/07/TEP-Preliminary-Integrated-Resource-Plan-070119-FINAL-Version-2.pdf.

Further, in TEP's Form 10-K, filed on February 15, 2019 with the Securities and Exchange Commission (SEC), the Company states, "[t]he effects of climate change may create operational and financial risks for TEP that, if realized, could negatively affect TEP's results of operations, net income, and cash flows." The 10-K goes on to state:

> Climate change may impact regional and global weather conditions and result in extreme weather events, including high temperatures, severe thunderstorms, drought, and wildfires. Changes in weather conditions or extreme weather events in TEP's service territory or affecting TEP's remote generation facilities or transmission system may lead to service outages and business interruptions, which could result in an increase in capital expenditures and operating expenses. Any increases in severity and frequency of weather-related system outages could affect TEP's operations and system reliability. Although physical utility assets have been constructed and are operated and maintained to withstand severe weather, there can be no assurance that they will successfully do so in all circumstances. In addition, changes in weather conditions or extreme weather events outside of TEP's service territory could result in higher wholesale energy prices, insurance premiums, and other costs, which could negatively impact TEP's business and operations. Any of these situations could have a negative impact on TEP's results of operations, net income, and cash flows.[10]

Q: DO YOU HAVE ANYTHING ELSE YOU WOULD LIKE TO ADD TO YOUR TESTIMONY?

A: Yes. While TEP's efforts to comply with the Paris Agreement are commendable, there is more work to be done. TEP has committed to comply with the Paris Agreement, which strives to keep global temperature rise to 1.5°C.[11] The Intergovernmental Panel on Climate Change states that to keep to a 1.5°C increase in global temperature, economy wide carbon emissions must be net zero by 2050, but earlier reductions are also needed, including a 45% carbon reduction by 2030.[12] TEP should continue its efforts to reduce its carbon. The Commission should require TEP to revisit fossil fuel retirement dates in

[10] TEP 2018 10-K, filed with the SEC Feb. 15, 2019, p. 13, https://www.sec.gov/Archives/edgar/data/100122/000010012219000004/tep10k12312018.htm.

[11] The Paris Agreement, United Nations, 2015. https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[12] Intergovernmental Panel on Climate Change's Special Report, *Global Warming of 1.5° C*, 2018, p.12. https://www.ipcc.ch/sr15/

future proceedings, including TEP's IRP proceedings. It may be prudent for TEP to retire SGS sooner than proposed in this rate case. In TEP IRP proceedings, 2030 or 2035 retirements should be examined.

VII. RECOMMENDATIONS

Q: WHAT ARE YOUR RECOMMENDATIONS TO THE COMMISSION?

A: The Commission is currently considering increasing the renewable energy requirements under its REST rules. Consistent with that work, TEP should be planning for a low carbon future now. A one for one replacement of coal with natural gas is an insufficient plan. Paying off fossil fuel units sooner, rather than later, mitigates the risk of creating stranded assets and prepares TEP for the likelihood that its proposed exit from fossil fueled generation is not ambitious enough. While TEP's advanced planned retirement dates on some of its fossil fuel units should be approved, TEP should be planning to retire all fossil fuel units by 2050, because the best available science reflects the need to decarbonize by mid-century.[13] Commitments from many of TEP's peers reflect the industry consensus that this is achievable. For these reasons, WRA makes the following recommendations:

First, the Commission should approve TEP's proposal to shorten the service lives of its thermal resources.

Second, the Commission should disapprove TEP's proposal to extend the service lives of its gas plants and, if the Commission approves TEP's plan to purchase Gila River Unit 2, it should approve a depreciation life for that unit of no later than 2048.

Third, the Commission should approve the depreciation rate adjustments to TEP assets recommended by Mr. Majoros and Mr. Garren, as a means of accepting the first two recommendations without causing an increase in customer rates.

---

[13] *Id.*

Fourth, the Commission should require TEP to evaluate the impact of closing SGS sooner in other proceedings, including within the IRPs.

Q: DOES THIS CONCLUDE YOUR TESTIMONY?

A: Yes.

ATTACHMENT A

AUTUMN T. JOHNSON

PO Box 30497, Phoenix, AZ 85046 • autumn.johnson@westernresources.org • (623) 439-2781 • linkedin.com/in/autumntjohnson

EDUCATION

DOCTOR OF PHILOSOPHY (PhD) • Public Policy and Administration
Boise State University • Boise, ID • 2016-Present • All but Dissertation (ABD)

MASTER OF BUSINESS ADMINISTRATION (MBA)
Seattle University • Seattle, WA • 2015 • Dean's List • Beta Gamma Sigma

DOCTOR OF JURISPRUDENCE (JD)
University of Oregon School of Law • Eugene, OR • 2010 • Law Review • Certificate: Environmental Law

BACHELOR OF ARTS (BA) • Women's Studies and History
University of Arizona • Tucson, AZ • 2006 • Magna cum Laude

PROFESSIONAL EXPERIENCE

ENERGY POLICY ANALYST
Western Resource Advocates • Phoenix, AZ • 2019-Present

- Develop and advocate for policies and mechanisms that reduce the environmental impact of electricity production in the west
- Represent WRA in regulatory, legislative, and other policy forums, including through written and oral testimony
- Provide counsel and strategic advice regarding state and federal energy regulation and administrative law
- Prepare pleadings and testimony for adversarial proceedings
- Negotiate and draft complex settlement agreements
- Assist with guidance of outside experts and legal consultants
- Liaise with electric utilities, the business community, consumer advocates, the environmental community, and other stakeholders to advance clean energy
- Monitor and track relevant state and federal policy developments

ADJUNCT PROFESSOR
Concordia University School of Law • Boise, ID • 2019-Present

- Teach within the Environmental and Natural Resources curriculum
- Develop new courses on agriculture law and energy law

ADJUNCT PROFESSOR
Boise State University, College of Business and Economics • Boise, ID • 2017

- Taught business and commercial law for undergraduate students

ASSISTANT DIRECTOR
Boise State University, Energy Policy Institute • Boise, ID • 2016-2019

- Conducted interdisciplinary research, often related to clean, zero-emission energy
- Published articles and book chapters related to environmental law and policy
- Facilitated business development through grants, contracts, and outreach to collaborators
- Advised on the strategic vision of EPI
- Built and maintained collaborative relationships with internal and external partners
- Managed operations, including reporting to the University and the Center for Advanced Energy Studies (CAES)
- Supervised graduate student workers and undergraduate interns
- Participated on Idaho Power's Integrated Resource Planning Advisory Council (IRPAC)

ADJUNCT PROFESSOR
Seattle University, Albers School of Business and Economics • Seattle, WA • 2016

- Taught business and international law for undergraduate students

PRINCIPAL & MANAGING ATTORNEY
Law Office of Puget Sound • Seattle, WA • 2012-2016

- Managed a law firm that practiced business and intellectual property law for small businesses and nonprofits

- Counseled entrepreneurs, small businesses, and startups in establishing, growing, or closing an entity; writing or negotiating contracts and governance documents; buying and selling businesses; litigation; and registering intellectual property
- Litigated issues ranging from medical malpractice or construction defects to bankruptcy
- Supervised all business operations including budgeting, website development, marketing, contract negotiations, and office administration

JUDICIAL LAW CLERK
Jerome County District Court • Jerome, ID • 2010-2012

- Researched and wrote judicial opinions, judgments, orders, and jury instructions; participated in a dozen court and jury trials
- Counseled the District Judge in all civil cases with damages over $10,000; all felony criminal cases; appeals from the Magistrate Court; and judicial review of agency actions
- Managed all recruitment and hiring of my replacement at the end of my clerkship term

VOLUNTEER EXPERIENCE

Fresh State Women's Foundation
Phoenix, AZ • 2019-Present

- Provide mentoring and career coaching
- Teach workshops on assertive communication and networking

Animal Legal Defense Fund
Cotati, CA • 2019-Present

- Volunteer attorney providing research support on a new legal textbook on industrial animal agriculture

Idaho State Bar, Animal Law Section
Boise, ID • 2019-Present

- Current member of the Board of Directors

Court Appointed Special Advocate (CASA)
Boise, ID • 2018-2019

- Guardian ad Litem for the Idaho 4th Judicial District
- Advocate on behalf of children in the foster care system

Idaho Women Lawyers
Boise, ID • 2017-2019

- Member of the Board of Directors & board liaison to the Judicial Recruitment Committee
- Chaired the community service committee

Legal Voice
Seattle, WA • 2012-2015

- Participated in the Self-Help Committee by making legal information readable and accessible to pro se litigants

Washington Women's Business Center • SCORE • Fledge, LLC • Rainier Valley Community Development Fund
Seattle, WA • 2013-2014

- Taught seminars and workshops on legal issues affecting small businesses, including intellectual property, contracts, and entity structure
- Counseled small businesses, nonprofits, and startups on potential legal issues and recommended solution

PROFESSIONAL LICENSES & MEMBERSHIPS

- Academy of Food Law & Policy
- American Bar Association and Practice Section: Environment, Energy & Resources
- Arizona Women Lawyers Association
- Association of Women in Energy
- Energy Bar Association
- Oregon State Bar and Practice Sections: Agricultural Law; Animal Law; Energy, Telecom & Utility Law; and Environmental & Natural Resources
- U.S. District Court, Western District of Washington
- Washington State Bar Association and Practice Sections: Animal Law and Environmental & Land Use Law
- Women of Renewable Industries and Sustainable Energy
- Women's Council on Energy & the Environment

PUBLICATIONS

"Ag-Gag" Laws and Consumer Information, in G. Steer and A. Friedlander (Eds.), *Food System Transparency*, CRC Press, 2020.

Food and Agriculture Law & Policy, in K. Fandl (Ed.), *Law and Public Policy: A Primer*, Routledge, 2018.

Overlapping Authorities in U.S. Energy Policy, *The Electricity Journal*, 30(9), 2017.

EXHIBIT 2

DIRECT TESTIMONY OF JAMES S. GARREN

On Behalf of WRA

Docket No. E-01933A-19-0028

TABLE OF CONTENTS

DIRECT TESTIMONY AND EXHIBITS

OF JAMES S. GARREN

INTRODUCTION

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is James S. Garren. I am an analyst with the economic consulting firm of Snavely King Majoros & Associates, Inc. ("Snavely King").

Q. HAVE YOU PREPARED A SUMMARY OF YOUR QUALIFICATIONS AND EXPERIENCE?

A. Yes. Attachment A is a summary of my qualifications and experience.

Q. Q. PLEASE DESCRIBE YOUR BACKGROUND IN UTILITY DEPRECIATION.

A. Since my employment at Snavely King in 2010, I have participated as an analyst in approximately 30 separate depreciation studies of electric, gas and water utilities on behalf of the firm's clients, most of which are state commissions or state-funded consumer advocate agencies. In that role, I have worked closely with the firm's principals in performing life and net salvage analyses, calculation of depreciation rates, and preparation of testimony. Additionally, I am familiar with the firm's proprietary depreciation software, the Snavely Comprehensive Investment Analysis System ("**SCIAS**"). I am also recognized as a Certified Depreciation Professional by the Society of Depreciation Professionals.[1]

[1] [1] "The Society of Depreciation Professionals was organized in 1987 to recognize the professional field of depreciation analysis and individuals contributing to this field; to promote the professional

Q. FOR WHOM ARE YOU APPEARING IN THIS PROCEEDING?

A. I am appearing on behalf of the Western Resource Advocates ("WRA").

Q. WHAT IS THE OBJECTIVE OF YOUR TESTIMONY?

A. Tucson Electric Power Company ("TEP" or "the Company") has filed an Application to change its rates with the Arizona Corporation Commission ("ACC" or "the Commission"). In its Application, the Company included a Depreciation Study with accompanying Direct testimony. WRA has intervened in this case with the objective of advocating for certain greenhouse emitting production plant to be retired earlier than the Company currently plans to retire that plant. Acknowledging that this objective could have a short term economic impact on consumers, WRA has retained my colleague Mr. Mike Majoros and myself to review TEP's Depreciation Study to determine whether off-setting adjustments can be made to mitigate the rate impact on consumers. Mr. Majoros is providing testimony regarding the rate treatment of Production plant.

The specific objective of my testimony is to review the Company's proposed depreciation rates and accruals for distribution and general plant. WRA witness Autumn Johnson is providing testimony to the Commission regarding the specific policy proposal, and my

---

development and professional ethics of practitioners in the field of depreciation analysis; to collect and exchange information about depreciation analysis; and to provide a national forum of programs and publications concerning depreciation." http://www.depr.org/?page=AboutUs. For certification, an applicant must have at least 5 years of full time professional depreciation experience, at least 2 years of which must be in the area of depreciation administration. Among other requirements, the applicant must pass a two part (Technical and Ethics) closed book examination which includes questions about, *inter alia,* Plant and Reserve Accounting, Life Analysis Concepts, Life Analysis Using Actuarial Models, Life Analysis Using Simulation Models, Salvage and Cost of Retiring Analysis, Technology Forecasting and Depreciation Calculations." http://www.depr.org/?page=Certification.

colleague Mike Majoros is providing testimony regarding the accounting treatment of Production plant. The objective of my testimony is to review the Company's Depreciation Study and determine if there are adjustments that can be made to decrease the Company's depreciation rates for Distribution or General functions. These adjustments do not, in all cases, represent the most accurate depiction of the Company's historical retirements. Rather, they are intended to meet the goal of providing offsets for ratepayers from the cost increases resulting from the shorter depreciable lives of production plant.

SUMMARY

Q. WHAT INFORMATION HAVE YOU REVIEWED IN PREPARATION FOR THIS TESTIMONY?

A. I have reviewed the written direct testimony and exhibits of Ronald White, including the Depreciation Study Dr. White prepared. Upon examination of this testimony and the Study, I prepared numerous data requests which were propounded by WRA at my request. I have now had the opportunity to review TEP's responses to these data requests as well as the documents attached to TEP's filing. In response to some of the data requests, WRA has been provided the depreciation data used by Mr. White to perform his studies. Utilizing this data, and my own analysis, I have proposed adjustments to the depreciation rates and accruals utilized for plant depreciation proposed by TEP in its proceeding before the Commission.

Q. WOULD YOU PLEASE SUMMARIZE THE TOTAL IMPACT OF THE NET SALVAGE ADJUSTMENTS YOU HAVE MADE?

Yes. Please refer to the table below for comparison of the depreciation rates and expenses. This table shows the depreciation expense impact based on the depreciation rates proposed by TEP, and my recommended adjustments.

Table - 1
Comparison of TEP White v. SKM.
Overall Depreciation expense
Based on Dec. 31,2018 Plant Balances

Current	**TEP**	**WRA**	**Difference** ***v. White***
Distribution	**$**30,029,780	$28,229,481	$***(1,800,299)***
General	$15,361,005	$14,063,631	$**(1,297,374**
Total			**$(3,097,673)**

Q. IN BRIEF, WHAT IS THE PRIMARY FACTOR, OR FACTORS, AS TO WHY YOUR PROPOSED DEPRECIATION RATES ARE LOWER THAN THE RATES PROPOSED BY COMPANY WITNESS WHITE?

A. The primary factors contributing to the lower depreciation rate are adjustments that I have made to the average service lives of seven distribution accounts and the amortization periods of four amortizable General plant accounts.

Q. ARE YOU SPONSORING ANY EXHIBITS IN CONJUNCTION WITH THIS TESTIMONY?

A. Yes, I am sponsoring two exhibits. I have prepared Exhibit JSG-1, which shows the calculation of my proposed depreciation rates for service lives on the Distribution and General functions. Exhibit JSG-2 contains the service life analysis for the accounts which I am proposing to adjust.

<u>DISCUSSION OF SERVICE LIVES</u>

Q. PLEASE DEFINE "AVERAGE SERVICE LIFE" AS IT IS USED IN UTILITY DEPRECIATION CALCULATIONS.

A. The "average service life" for a given account is a projection of the number years that a new unit of plant can be expected to remain used and useful on average. Many units in a given account will be retired at earlier ages, and thus have a shorter than average life, and many units will retire at later ages, and thus have a longer than average life. Average service life is used to calculate the average remaining life, which, in turn, is the denominator in the calculation of depreciation expense. Therefore, all else being equal, a longer average service life directly results in a lower depreciation expense.

Q. PLEASE DESCRIBE THE PROPER WAY TO DETERMINE THE AVERAGE SERVICE LIFE COMPONENT OF DEPRECIATION RATES.

A. I have analyzed TEP's transmission accounts using an actuarial life analysis process called the Retirement Rate method. Actuarial methodologies were developed initially in the 17th and 18th centuries, primarily by life insurance companies that needed mathematical means of estimating the mortality risk of individuals over a long period of time. This resulted in the development of "life tables," which show the mortality risk of a group of individuals with similar risk factors at each age.

The Retirement Rate method is an actuarial technique used to study plant lives, much like the actuarial techniques used in the insurance industry to study human lives. It requires a record of the dates of placement (birth) and retirement (death) for each asset unit studied. Retirement data that contains this date of placement and retirement is referred to as "aged data" because it tells the analyst the age of the plant at the time it was retired. The Retirement Rate method is the most sophisticated of the statistical life analysis methods because it relies on the most refined level of data.

In the Retirement Rate method, aged retirements and total plant in service at a given age (referred to collectively as "exposures") from a company's records are used to construct an observed or original life table. I discuss the composition of an observed life table in detail below. The details are important because they result in data points showing the percentage of a given unit of plant that is expected to survive at a given age. The actuarial analysis smooths and extends the observed life table by fitting it to a family of 31 standardized survivor curves ("Iowa curves"). The curve-fitting uses the least squared differences approach to find a best fit life for each curve. The "sum of least squared difference" is a common means of fitting curves (in this case the Iowa curves) to a set of data (in this case the observed life table data). The difference between each point of data and a point on a line is squared, and the square of all of those differences is summed to provide the total difference between the set of data and the line. The line that produces the least difference from the set of data is considered the "best fit." The purpose of squaring the difference is to ensure that negative differences contribute to the overall difference rather than canceling out positive differences.

Numerous iterative calculations are required for a Retirement Rate analysis. In the end, the analysis produces a life and Iowa curve best fit for a single average vintage. This is the same type of analysis that Mr. White has performed to arrive at his own proposed average service lives.

Q. WHAT ARE IOWA CURVES?

A. An Iowa curve is a surrogate or standardized observed life table based on a specific pattern of retirements around an average service life. The Iowa curves were devised over 60 years ago at Iowa State University. The curves provide a set of standard patterns of retirement dispersion. Retirement dispersion merely recognizes that accounts are comprised of individual assets or units having different lives.

For example, imagine an account that begins with a new addition of one hundred units. These units are unlikely to all retire at the same time. Rather, different units within the group will retire at different times. Represented graphically, the result might appear as follows:

Graph -1

Age:	Units Retired
10	0
20	5
30	10
40	20
50	30
60	20
70	10
80	5
90	0

In this example, the average service life would be fifty, and the retirement dispersion curve would tell us how the retirements are arranged around the average service life. In this example, the distribution of retirements around the average service life is symmetrical, with the "mode," or the age with the highest number of retirements, being at the average service life. In this data, the retirements are also relatively tightly grouped around the average service life.

Iowa curves describe many different patterns of dispersions. Returning to our example, imagine a different pattern of retirements as follows:

Graph -2

Age:	Units Retired
10	5
20	5
30	10
40	20
50	10
60	10
70	10
80	10
90	10

In this example, the average service life is still fifty but the dispersion characteristics are very different. The mode is at age 40, which is an earlier age than the average, and overall the distribution of retirements is more spread out than in the previous example. By using different types of Iowa curves, I can capture these different characteristics that can be seen in retirement data.

One way that Iowa curves illustrate these different patterns is by their orientation as left-skewed, symmetrical or right-skewed curves, which are known, respectively, as "L curves," "S curves," and "R curves." The letters describe the location of the "mode," as discussed above, relative to the average service life. Hence, in the first example, which is symmetrical, I would use an "S curve," whereas in the second example, in which the mode was at a younger age than the average service life, I would use an "L curve." If the mode falls after the average service life, then I would use an "R curve." In addition to L, S and R curves, there is a set of Origin Modal, or "O curves," which are so called because the mode for these curves is at age one, or the "origin." Generally speaking, O-shaped Iowa curves are not appropriate for utility plant.

In addition to the letter that describes the location of the mode, Iowa curves are numbered one through six, which identifies the spread of the retirement dispersion. Lower numbers represent a wider retirement dispersion. Referring back to the first example above, in which the retirements were more tightly grouped around the average service life, a higher number would be used, whereas in the second example, in which the retirements were more diffuse, a lower number would be used.

To combine these two concepts, an appropriate Iowa curve for the first example might be an S5, whereas an appropriate Iowa curve for the second example might be a L2. This combination of one letter and one number defines a dispersion pattern. Adding an average service life to an Iowa curve (*e.g.*, 5-S0) provides a survivor curve intended to depict a reasonable expectation of how a group of assets will survive, or conversely be retired, over the expected average service life.

Table RC-0005-2 below compares curves with the same shape (S0) but different average service lives (5- and 10-years) to illustrate different iterations with the same curve. The percent surviving represents the amount of plant surviving at each age interval shown in the first column. The 5S0 life and curve sums to the five-year average service life, while the 10S0 life and curve sums to a ten-year average service life.

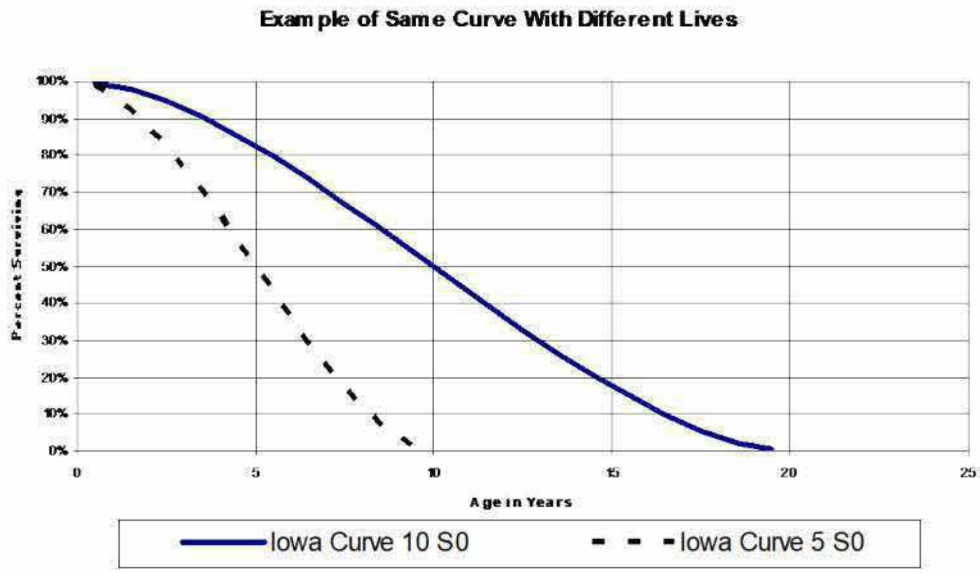
Table-2

Sample Survivor Curves

	5 S0 Curve	**10 S0 Curve**
Age	**Percent Surviving**	**Percent Surviving**
0.5	0.99	1.00
1.5	0.92	0.98
2.5	0.83	0.94
3.5	0.70	0.90
4.5	0.57	0.85
5.5	0.43	0.80
6.5	0.30	0.74
7.5	0.17	0.67
8.5	0.08	0.60
9.5	0.01	0.53
10.5		0.47
11.5		0.40
12.5		0.33
13.5		0.26
14.5		0.20
15.5		0.15
16.5		0.10
17.5		0.06
18.5		0.02
19.5		0.00
Total	**5.00**	**10.00**

These are called "curves" because, when plotted on charts with the x-axis representing "age" and the y-axis representing "percent surviving," they appear as shown below in Graph 3:

Graph-3



Q. HOW DO YOU USE THE IOWA CURVES IN YOUR SERVICE LIFE ANALYSIS?

A. The purpose of Iowa curves is to enable the calculation of an average remaining life. Remaining life calculations take the current age of each vintage within an account and then use the retirement rate projected by the appropriate Iowa curve to project the remaining life of each of these vintages of plant. Ultimately, depreciation accruals for plant investment are calculated from remaining lives, so it is important to select the correct average service life and the correct Iowa curve.

Q. IS IT NECESSARY TO FIT ALL OF THE AVAILABLE DATA POINTS TAKEN FROM THE OBSERVED LIFE TABLE?

A. No. In some cases, it is appropriate to disregard some or even many of the oldest aged data. This is because actuarial data that the company keeps often is tied to long-lived assets that represent so small a percentage of the total plant as to not be statistically significant or represent accounting anomalies, such as retirements that were never recorded. This process, which is represented in the graphs below, is called a "T-cut." While there is no hard and fast rule for where a T-cut is appropriate, it is generally appropriate to make a T-cut where the remaining retirement data diverges materially from the established pattern of retirements seen to that point.

As will be discussed in detail below, the decision to make a T-cut, and at what point in the data set to make the cut, is one of the most important, yet subjective, elements to an actuarial analysis. In most cases, making a "larger" T-cut (that is, one that results in fitting the curve to less of the actuarial data) will result in a shorter estimated average service life, because the data eliminated is for the longest lived assets in the set of data.

Additionally, an inconclusive analysis may occur if data points are eliminated from an observed life table with a limited data set (that is, an account that has reliably few recorded retentions). Typically, the portion of an Iowa curve between 85% surviving and 15% surviving most distinguishes one curve from another. With the exception of O curves, Iowa curves follow a parabolic distribution of retirements. That is, as we discussed above, they tend to have limited retirements at the beginnings and ends of their life. Thus, the portion between 85% and 15% surviving is the most indicative because that is when the bulk of retirements in a given account happen, and where variation in the pattern of retirements tends to occur. If a T-cut eliminates too much of the observed life table data, the matching of that data to an Iowa curve will be more likely to produce ambiguous and misleading results. I believe that the full set of aged data should be used in the service life analysis unless specific circumstances warrant exclusion of the data.

Q. DO YOU HAVE ANY CONCERNS WITH THE SERVICE LIVES COMPONENT OF MR. WHITE'S DEPRECIATION STUDY FOR TEP?

A. I do not have any general concerns with Dr. White's Study. Dr. White has conducted his analysis of TEP's service lives in an appropriate fashion, and has, for the most part proposed average service lives that are consistent with the historical data. However, for Accounts 361.00 – Structures and Improvements, Dr. White's proposed average service lives represent a significant departure from the historical data. As a result, for this account, I have proposed the average service life and curve shape that best fits the historical data.

Q. CAN YOU PROVIDE A SUMMARY OF THE SERVICE LIFE ADJUSTMENTS THAT YOU ARE PROPOSING?

A. Yes. The below tables summarizes the life adjustments that I have made for the depreciable accounts.

Table-3

		TEP Proposed Life-Curve	WRA Proposed Life-Curve
361.00	Structures and Improvements	60 - R1	75 - S0.5
362.00	Station Equipment	55 - R1.5	62 – R3
365.00	Overhead Conductors and Devices	55 – R4	60 – R5
366.00	Underground Conduit	60 - R4	67 – S6
368.UG	Line Transformers – Underground	50 - R2	54 – L2
369 UG	Services – Underground	65 – S4	68 – S6
370.00	Meters	17 – L0.5	20 – L0.5

Q. CAN YOU DESCRIBE THE BASIS FOR THE ADJUSTMENTS THAT YOU HAVE MADE FOR THESE SEVEN ACCOUNTS?

A. Yes. As described above, for Account 361.00 I have proposed an average service life that is in line with the historical retirement record. For the other six accounts, I am proposing longer average service lives that are longer than supported by the historical record, but with curve-shapes that represent expectations of higher retirement rates in the more distant future. This achieves the goal of providing depreciation rate decreases in the short term to offset earlier production plant retirements, while at the same time attempting to align long-term depreciation rates with those of the best-fitting life-curve combinations.

Q. HAVE YOU PROVIDED THE RESULTS OF YOUR MATHEMATICAL FITTING ANALYSIS?

A. Yes, Exhibit JSG-2 includes a Schedule titled "Best Fit Curve Results" for each account studied that shows my mathematical curve fitting analysis. For each of these accounts, I have selected the best-fitting life and curve combination.

<u>**AMORTIZABLE GENERAL ACCOUNTS**</u>

Q. CAN YOU DESCRIBE THE ADJUSTMENTS YOU ARE PROPOSING TO THE COMPANY'S AMORTIZABLE ACCOUNTS?

A. Yes, the table below summarizes the adjustments I have made to the amortization periods for four of the Company's accounts.

Table-4

		TEP Proposed Amortization	WRA Proposed Amortization
391.20	Network and Data Equipment	5	7
393.00	Stores Equipment	15	20
394.00	Tools, Shop and Garage Equipment	17	20
395.00	Laboratory Equipment	17	20

Q. HOW ARE AMORTIZATION PERIODS FOR GENERAL ACCOUNTS DETERMINED?

A. Amortization periods for general accounts are essentially arbitrary, and are based on a reasonable estimate of the average life of a given plant type. For each of the accounts listed above, I have reviewed the available plant records, as well as the amortization periods utilized for other Company's for each account. In my estimation, these adjustments to the amortization periods, and the depreciation rates that result, represent reasonable adjustments to the periods and rates proposed by Dr. White.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

James S. Garren

Experience

Snavely, King, Majoros, and Associates, Inc.

Consultant (2010-Present)

Mr. Garren provides expert witness testimony to clients, specializing in the area of depreciation. Mr. Garren also provides analytical support to SK clients and principals including quantitative and qualitative analysis, preparation of client presentations, and case management. Mr. Garren works primarily in the areas of depreciation but has also prepared exhibits for use in the revenue requirement, cost-allocation, rate design, and rate of return aspects of regulatory proceedings. Mr. Garren has also assisted with the preparation of two valuation studies on municipal water companies.

Mr. Garren is a member of, and has been made a Certified Depreciation Professional, by the Society of Depreciation Professionals. In addition, Mr. Garren has attended the National Association of Regulated Utility Commissioners' Rate School.

Issue Advocacy Organization

State Policies Assistant 2009

Assisted with a wide variety of tasks including, but not limited to research, updating organization website with current news, extensive member/supporter communication, and database maintenance.

Binder and Binder, LLC

Client Advocate/Non-Attorney Representative 2007-2008

Mr. Garren's primary duties at Binder were legal writing; producing client and ALJ correspondence, case memoranda, expert witness interrogatories, and arguments in favor of appeal. From July 2007 acted as the company president's primary legal writer. In June of 2007, Mr. Garren became certified as a non-attorney representative. From that time, responsibilities included performing three to five Social Security Disability hearings per week.

Mr. Garren was also responsible for thoroughly developing medical and vocational evidence from the initial filing phase, through Administrative hearing.

Education

Marlboro College, Marlboro, Vermont, B.A. - Literature and Philosophy

Mr. Garren fulfilled Marlboro College's graduation requirement with a thesis on ethical issues in the works of Dostoevsky and Nietzsche. Exploring early post-modern ethical thinking in literature and philosophy.

James Shay Garren

PROJECTS AND APPEARANCES

Federal Energy Regulatory Commission

Docket No. ER17-2154-000 Pacific Gas and Electric

MD Public Service Commission

Case No. 9490 Potomac Edison
Case No. 9480 Columbia Gas
Case No. 9447 Columbia Gas
Case No 9424 Delmarva
Case No. 9385 Pepco
Case No. 9355 Baltimore Gas and Electric

New Jersey Board of Public Utilities

Docket No. ER18010029 & GR18010030 Public Service Electric and Gas
Docket No WR17090985 New Jersey American Water
Docket No. ER13111135 Rockland Electric Company
Docket No. GR16090826 Elizabeth Town Gas
Docket No. WR18050593 Suez Water and Wastewater

Pennsylvania Public Utilities Commission

Docket No. R-2017-2640058 UGI Utilities Inc. – Electric Division
Docket Nos. R-2016-2537349, 2537352, 2537355, 2537459, First Energy Companies.
Docket No. 2015-2518439 UGI Utilities Gas Division

West Virginia Public Service Commission

Case No. 15-0048-G-D Mountaineer Gas

Colorado Public Service Commission

Proceeding No. 16A-0231E – Public Service of Colorado

Hawai'i Public Utilities Commission

Docket No. 2016-0431 Hawai'i Electric, Hawai'i Electric Light, and Maui Electric

Georgia Public Utilities Commission

Georgia Power Company's 2013 Rate Case - Docket No. 36989

Kansas Corporation Commission

Kansas Gas Company 2018 Rate Case Docket No. 18-KGSG-560-RTS
Empire District Electric Co. 2019 Rate Case Docket No. 19-EPDE-223-RTS

Calculation of Annual Accruals for Distribution and Amortizable General Accounts
Based on Plant in Service as of 12/31/17
Snavely King Majoros & Assoc.

		Average Service Life and Iowa Curve	Plant in Service as of 12/31/17	Redistributed Reserve	Future Accruals	Remaining Life	Annual Depreciation Accruals	Depreciation Rate
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
DISTRIBUTION PLANT								
360.RW	Land Rights	60 - R5	$ 8,046,929	$ 4,030,301	$ 4,016,628.26	34.27	$ 117,205	1.46%
361.00	Structures and Improvements	75 - S0.5	12,315,170	2,548,582	9,766,588	65.48	149,154	1.21%
362.00	Station Equipment	62 - R3	239,900,296	63,587,335	176,312,961	47.06	3,746,557	1.56%
364.00	Poles, Towers and Fixtures	55 - R2.5	259,526,671	73,787,410	185,739,261	41.77	4,446,714	1.71%
365.00	Overhead Conductors and Devices	60 - R5	205,962,521	69,791,899	136,170,622	43.34	3,141,916	1.53%
366.00	Underground Conduit	67 - S6	68,002,378	26,832,600	41,169,778	46.00	894,995	1.32%
367.00	Underground Conductors and Devices	50 - R4	328,318,200	126,895,253	201,422,947	33.36	6,037,858	1.84%
368.OH	Line Transformers - Overhead	53 - S0	109,966,357	35,898,179	74,068,178	38.64	1,916,878	1.74%
368.UG	Line Transformers - Underground	54 - L2	185,330,599	59,929,876	125,400,723	39.01	3,214,579	1.73%
369.OH	Services - Overhead	48 - S3	21,950,977	8,513,525	13,437,452	31.86	421,766	1.92%
369.UG	Services - Underground	68 - S6	129,291,266	37,890,343	91,400,923	51.66	1,769,278	1.37%
370.00	Meters	20 - L0.5	47,032,638	10,002,087	37,030,551	16.69	2,218,727	4.72%
373.00	Street Lighting and Signal Systems	53 - R3	12,817,262	5,071,916	7,745,346	34.6	223,854	1.75%
Total Distribution Plant			$ 1,628,461,264				$ 28,299,481	1.74%
Amortizable General								
391.00	Furniture and Office Equipment		$ 25,603,745	$ 9,709,713		24	$ 1,066,822.71	4.2%
391.20	Network and Data Equipment		35,890,669	17,060,996		7	$ 5,127,238.43	14.3%
393.00	Stores Equipment		1,696,156	793,942		20	$ 84,807.80	5.0%
394.00	Tools, Shop and Garage Equipment		8,573,201	3,431,382		20	$ 428,660.05	5.0%
395.00	Laboratory Equipment		5,989,060	2,766,365		20	$ 299,453.00	5.0%
397.20	Telecommunications Equipment		101,753,513	36,463,416		15	$ 6,783,567.53	6.7%
398.00	Miscellaneous Equipment		5,461,636	2,390,726		20	$ 273,081.80	5.0%
			$ 184,967,980				$ 14,063,631	

Observed Life Table Results

TEP

Account: 361.00 - Structures and Improvements

Age	Exposures	Retiremen	Retiremen Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		1940 - 2017			
0	7,994,978	0	0.0000	100.0000	1.0000
0.5	10,906,298	0	0.0000	100.0000	1.0000
1.5	10,588,587	63,043	0.5954	99.4046	1.0000
2.5	9,331,625	0	0.0000	100.0000	0.9940
3.5	8,928,484	0	0.0000	100.0000	0.9940
4.5	9,803,567	4,254	0.0434	99.9566	0.9940
5.5	9,740,391	465	0.0048	99.9952	0.9936
6.5	5,733,670	19,132	0.3337	99.6663	0.9936
7.5	4,767,561	0	0.0000	100.0000	0.9903
8.5	3,928,862	18,336	0.4667	99.5333	0.9903
9.5	3,988,448	97	0.0024	99.9976	0.9856
10.5	3,861,666	0	0.0000	100.0000	0.9856
11.5	3,902,842	774	0.0198	99.9802	0.9856
12.5	3,199,820	3,399	0.1062	99.8938	0.9854
13.5	3,373,936	1,287	0.0382	99.9618	0.9844
14.5	3,000,224	482	0.0161	99.9839	0.9840
15.5	2,437,924	7,066	0.2898	99.7102	0.9838
16.5	2,688,883	37,534	1.3959	98.6041	0.9810
17.5	2,467,473	83,677	3.3912	96.6088	0.9673
18.5	2,476,298	70,702	2.8551	97.1449	0.9345
19.5	2,393,877	14,600	0.6099	99.3901	0.9078
20.5	2,374,068	2,850	0.1200	99.8800	0.9023
21.5	2,436,582	74,699	3.0657	96.9343	0.9012
22.5	2,376,515	61,095	2.5708	97.4292	0.8736
23.5	2,352,334	17,359	0.7379	99.2621	0.8511
24.5	2,405,252	30,579	1.2714	98.7286	0.8448
25.5	2,357,312	13,666	0.5797	99.4203	0.8341
26.5	2,270,721	14,034	0.6180	99.3820	0.8292
27.5	2,230,718	483	0.0217	99.9783	0.8241
28.5	2,207,347	3,081	0.1396	99.8604	0.8239
29.5	2,205,969	11,444	0.5188	99.4812	0.8228
30.5	2,167,559	4,205	0.1940	99.8060	0.8185
31.5	2,161,341	356	0.0165	99.9835	0.8169
32.5	2,164,462	28,475	1.3156	98.6844	0.8168
33.5	2,047,541	59,272	2.8948	97.1052	0.8061
34.5	1,968,357	816	0.0415	99.9585	0.7827
35.5	1,942,125	70,497	3.6299	96.3701	0.7824
36.5	1,870,320	5,511	0.2947	99.7053	0.7540
37.5	1,857,042	43,072	2.3194	97.6806	0.7518
38.5	1,778,509	13,828	0.7775	99.2225	0.7343

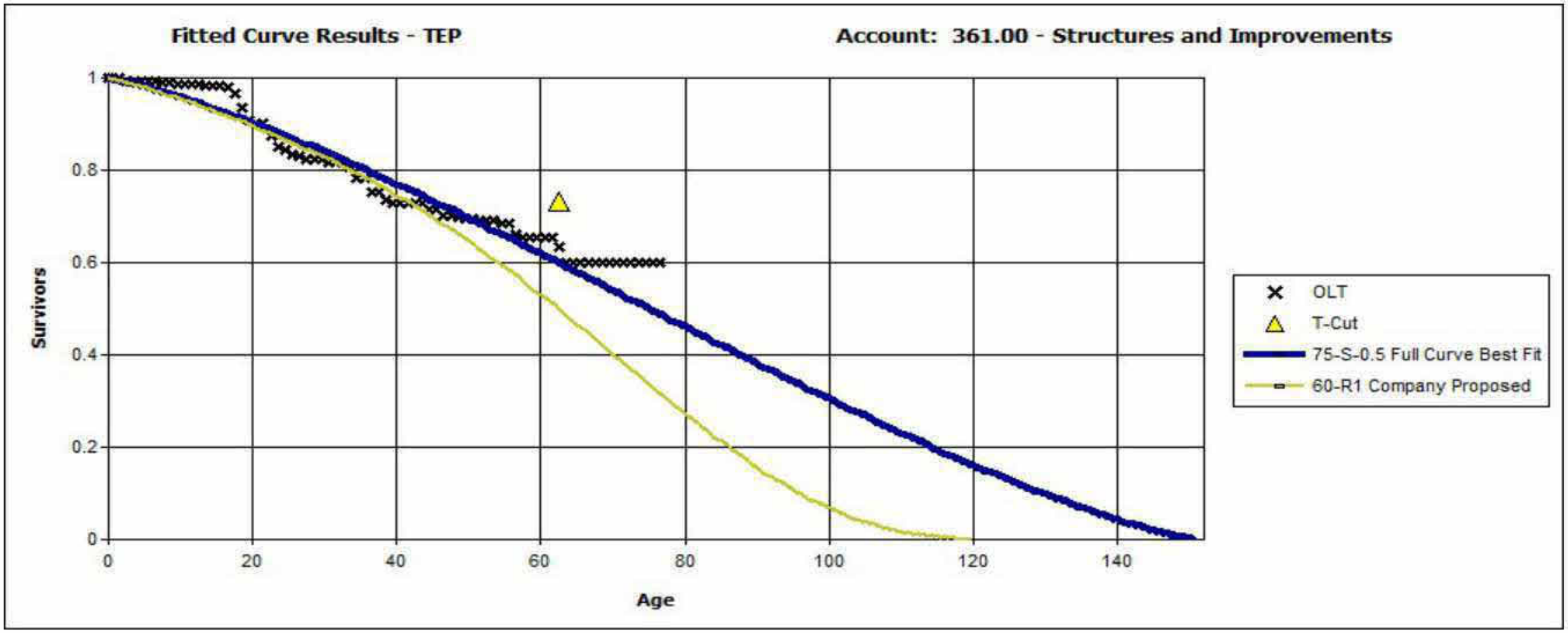
39.5	1,706,203	704	0.0413	99.9587	0.7286
40.5	1,703,453	516	0.0303	99.9697	0.7283
41.5	1,662,061	157	0.0094	99.9906	0.7281
42.5	1,528,560	0	0.0000	100.0000	0.7280
43.5	1,339,976	22,838	1.7043	98.2957	0.7280
44.5	1,023,436	1,544	0.1509	99.8491	0.7156
45.5	777,342	14,933	1.9211	98.0789	0.7145
46.5	541,727	248	0.0458	99.9542	0.7008
47.5	441,302	925	0.2096	99.7904	0.7005
48.5	369,013	1,389	0.3764	99.6236	0.6990
49.5	327,568	0	0.0000	100.0000	0.6964
50.5	303,694	1,896	0.6243	99.3757	0.6964
51.5	174,155	416	0.2389	99.7611	0.6921
52.5	153,469	0	0.0000	100.0000	0.6904
53.5	131,117	1,350	1.0297	98.9703	0.6904
54.5	67,913	0	0.0000	100.0000	0.6833
55.5	67,109	2,220	3.3085	96.6915	0.6833
56.5	49,082	575	1.1715	98.8285	0.6607
57.5	20,511	0	0.0000	100.0000	0.6529
58.5	19,590	0	0.0000	100.0000	0.6529
59.5	19,590	0	0.0000	100.0000	0.6529
60.5	18,747	0	0.0000	100.0000	0.6529
61.5	16,169	474	2.9331	97.0669	0.6529
62.5	12,377	643	5.1944	94.8056	0.6338
63.5	9,032	0	0.0000	100.0000	0.6009
64.5	7,547	0	0.0000	100.0000	0.6009
65.5	7,498	0	0.0000	100.0000	0.6009
66.5	3,461	0	0.0000	100.0000	0.6009
67.5	2,471	0	0.0000	100.0000	0.6009
68.5	1,241	0	0.0000	100.0000	0.6009
69.5	1,241	0	0.0000	100.0000	0.6009
70.5	637	0	0.0000	100.0000	0.6009
71.5	454	0	0.0000	100.0000	0.6009
72.5	167	0	0.0000	100.0000	0.6009
73.5	167	0	0.0000	100.0000	0.6009
74.5	0	0	0.0000	100.0000	0.6009
75.5	0	0	0.0000	100.0000	0.6009
76.5	0	0	0.0000	100.0000	0.6009

Best Fit Curve Results
TEP
Account: 361.00 - Structures and Improvements

Curve	Life	Sum of Squared Differences
BAND	**1940 - 2017**	
S-0.5	75.0	491.627
R0.5	74.0	540.048
R1	67.0	710.057
L0.5	75.0	772.742
S0	70.0	820.085
O1	75.0	1,002.137
L1	73.0	1,192.077
R1.5	64.0	1,199.693
L0	75.0	1,200.200
S0.5	67.0	1,444.044
L1.5	70.0	2,110.581
R2	62.0	2,129.004
S1	64.0	2,422.162
O2	75.0	2,575.412
R2.5	61.0	3,401.623
S1.5	63.0	3,576.848
L2	67.0	3,608.405
S2	62.0	5,137.833
R3	60.0	5,157.888
L3	64.0	6,967.938
S3	61.0	8,469.840
R4	59.0	8,988.285
L4	62.0	10,712.217
S4	60.0	13,039.708
O3	75.0	13,457.204
R5	60.0	14,906.060
L5	61.0	15,035.875
S5	60.0	17,479.665
S6	61.0	21,347.628
SQ	63.0	29,971.171
O4	75.0	31,435.143

Analytical Parameters

OLT Placement Band:	1940 - 2017
OLT Experience Band:	1940 - 2017
Minimum Life Parameter	4
Maximum Life Paramete	75
Life Increment Paramete	1
Max Age (T-Cut):	62.5



Analytical Parameters

OLT Placement Band:	1940 - 2017
OLT Experience Band:	1940 - 2017
Minimum Life Parameter:	4
Maximum Life Parameter:	75
Life Increment Parameter:	1
Max Age (T-Cut):	62.5

TEP

361.00 - Structures and Improvements

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 75 S-0.5

Year	Age	Surviving Investment	BG/VG Average Service Life	BG/VG Average Remaining Life	ASL Weights	RL Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	82,718	75.00	74.63	1,103	82,310
2016	1.5	333,892	75.00	73.90	4,452	328,991
2015	2.5	136,565	75.00	73.18	1,821	133,259
2014	3.5	884,524	75.00	72.48	11,794	854,814
2013	4.5	189,979	75.00	71.79	2,533	181,839
2012	5.5	91,720	75.00	71.10	1,223	86,954
2011	6.5	3,453,110	75.00	70.43	46,041	3,242,574
2010	7.5	854,963	75.00	69.76	11,400	795,218
2009	8.5	875,449	75.00	69.10	11,673	806,572
2008	9.5	0	75.00	68.45	0	0
2007	10.5	0	75.00	67.80	0	0
2006	11.5	0	75.00	67.16	0	0
2005	12.5	911,171	75.00	66.53	12,149	808,226
2004	13.5	224,490	75.00	65.90	2,993	197,246
2003	14.5	670,690	75.00	65.28	8,943	583,735
2002	15.5	960,965	75.00	64.66	12,813	828,473
2001	16.5	15,926	75.00	64.05	212	13,600
2000	17.5	282,245	75.00	63.44	3,763	238,746
1999	18.5	37,113	75.00	62.84	495	31,095
1998	19.5	51,514	75.00	62.24	687	42,751
1997	20.5	30,339	75.00	61.65	405	24,939
1996	21.5	62,802	75.00	61.06	837	51,131
1995	22.5	5,637	75.00	60.48	75	4,545
1994	23.5	26,197	75.00	59.90	349	20,922
1993	24.5	24,009	75.00	59.32	320	18,990
1992	25.5	25,173	75.00	58.75	336	19,719
1991	26.5	89,089	75.00	58.18	1,188	69,110
1990	27.5	2,288	75.00	57.62	31	1,757
1989	28.5	31,261	75.00	57.05	417	23,781
1988	29.5	0	75.00	56.50	0	0

1987	30.5	31,532	75.00	55.94	420	23,520
1986	31.5	6,955	75.00	55.39	93	5,137
1985	32.5	0	75.00	54.84	0	0
1984	33.5	91,382	75.00	54.30	1,218	66,160
1983	34.5	21,567	75.00	53.76	288	15,458
1982	35.5	30,599	75.00	53.22	408	21,712
1981	36.5	6,552	75.00	52.68	87	4,602
1980	37.5	8,888	75.00	52.15	119	6,180
1979	38.5	36,690	75.00	51.62	489	25,252
1978	39.5	59,027	75.00	51.09	787	40,209
1977	40.5	2,651	75.00	50.56	35	1,787
1976	41.5	41,176	75.00	50.04	549	27,474
1975	42.5	131,491	75.00	49.52	1,753	86,822
1974	43.5	188,584	75.00	49.00	2,514	123,217
1973	44.5	293,869	75.00	48.49	3,918	189,989
1972	45.5	244,205	75.00	47.98	3,256	156,210
1971	46.5	220,682	75.00	47.46	2,942	139,659
1970	47.5	100,548	75.00	46.96	1,341	62,950
1969	48.5	71,364	75.00	46.45	952	44,197
1968	49.5	39,296	75.00	45.94	524	24,072
1967	50.5	23,874	75.00	45.44	318	14,465
1966	51.5	127,643	75.00	44.94	1,702	76,485
1965	52.5	20,270	75.00	44.44	270	12,011
1964	53.5	22,353	75.00	43.95	298	13,097
1963	54.5	76,146	75.00	43.45	1,015	44,115
1962	55.5	804	75.00	42.96	11	461
1961	56.5	15,807	75.00	42.47	211	8,950
1960	57.5	27,996	75.00	41.98	373	15,669
1959	58.5	921	75.00	41.49	12	509
1958	59.5	0	75.00	41.00	0	0
1957	60.5	842	75.00	40.52	11	455
1956	61.5	2,578	75.00	40.04	34	1,376
1955	62.5	3,318	75.00	39.56	44	1,750
1954	63.5	2,702	75.00	39.08	36	1,408
1953	64.5	1,485	75.00	38.60	20	764
1952	65.5	49	75.00	38.12	1	25
1951	66.5	4,038	75.00	37.65	54	2,027
1950	67.5	990	75.00	37.17	13	491
1949	68.5	1,229	75.00	36.70	16	602
1948	69.5	0	75.00	36.23	0	0
1947	70.5	604	75.00	35.76	8	288
1946	71.5	183	75.00	35.29	2	86
1945	72.5	287	75.00	34.82	4	133
1944	73.5	0	75.00	34.36	0	0
1943	74.5	167	75.00	33.89	2	75
1942	75.5	0	75.00	33.43	0	0
1941	76.5	0	75.00	32.97	0	0

1940	77.5	0	75.00	32.51	0	0
		12,315,170			164,202	10,751,147

AVERAGE SERVICE LIFE 75.00

AVERAGE REMAINING LIFE 65.48

Observed Life Table Results

TEP

Account: 362.00 - Station Equipment

Age	Exposures	Retirements	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		**1939 - 2017**			
0	133,489,243	0	0.0000	100.0000	1.0000
0.5	135,817,959	434,386	0.3198	99.6802	1.0000
1.5	130,102,324	-5,373	-0.0041	100.0041	0.9968
2.5	123,386,429	121,718	0.0986	99.9014	0.9968
3.5	112,446,774	308,606	0.2744	99.7256	0.9959
4.5	107,933,405	180,434	0.1672	99.8328	0.9931
5.5	103,378,525	326,834	0.3162	99.6838	0.9915
6.5	92,726,432	347,288	0.3745	99.6255	0.9883
7.5	84,716,966	525,531	0.6203	99.3797	0.9846
8.5	75,782,228	354,483	0.4678	99.5322	0.9785
9.5	73,645,639	290,465	0.3944	99.6056	0.9739
10.5	69,880,922	1,184,107	1.6945	98.3055	0.9701
11.5	69,967,443	95,665	0.1367	99.8633	0.9537
12.5	66,053,978	168,955	0.2558	99.7442	0.9524
13.5	63,220,252	253,197	0.4005	99.5995	0.9499
14.5	57,598,718	775,823	1.3469	98.6531	0.9461
15.5	56,912,460	233,198	0.4097	99.5903	0.9334
16.5	55,290,935	886,678	1.6037	98.3963	0.9296
17.5	52,668,681	218,709	0.4153	99.5847	0.9146
18.5	52,654,875	404,085	0.7674	99.2326	0.9108
19.5	52,718,393	867,435	1.6454	98.3546	0.9039
20.5	49,323,933	378,444	0.7673	99.2327	0.8890
21.5	49,395,306	368,708	0.7464	99.2536	0.8822
22.5	48,022,229	208,578	0.4343	99.5657	0.8756
23.5	46,916,746	561,028	1.1958	98.8042	0.8718
24.5	46,605,484	390,008	0.8368	99.1632	0.8614
25.5	46,534,807	424,583	0.9124	99.0876	0.8541
26.5	44,445,844	646,843	1.4554	98.5446	0.8464
27.5	42,165,572	145,411	0.3449	99.6551	0.8340
28.5	41,169,489	408,677	0.9927	99.0073	0.8312
29.5	41,491,524	54,919	0.1324	99.8676	0.8229
30.5	40,127,004	464,659	1.1580	98.8420	0.8218
31.5	39,100,515	240,439	0.6149	99.3851	0.8123
32.5	37,083,973	324,465	0.8749	99.1251	0.8073
33.5	36,528,888	948,414	2.5963	97.4037	0.8002
34.5	34,467,819	453,672	1.3162	98.6838	0.7795
35.5	33,100,352	172,993	0.5226	99.4774	0.7692
36.5	32,351,226	67,745	0.2094	99.7906	0.7652
37.5	31,098,039	460,065	1.4794	98.5206	0.7636
38.5	28,223,456	325,616	1.1537	98.8463	0.7523

39.5	27,080,174	267,408	0.9875	99.0125	0.7436
40.5	24,869,367	143,608	0.5774	99.4226	0.7363
41.5	21,459,870	66,619	0.3104	99.6896	0.7320
42.5	19,255,567	237,837	1.2352	98.7648	0.7297
43.5	17,853,528	372,025	2.0838	97.9162	0.7207
44.5	16,292,224	509,697	3.1285	96.8715	0.7057
45.5	13,611,503	27,298	0.2006	99.7994	0.6836
46.5	12,187,231	23,470	0.1926	99.8074	0.6823
47.5	10,970,043	115,703	1.0547	98.9453	0.6809
48.5	8,836,544	160,900	1.8208	98.1792	0.6738
49.5	7,933,926	5,269	0.0664	99.9336	0.6615
50.5	7,371,940	510,585	6.9261	93.0739	0.6611
51.5	5,551,953	191,928	3.4569	96.5431	0.6153
52.5	5,355,211	147,600	2.7562	97.2438	0.5940
53.5	4,930,810	105,032	2.1301	97.8699	0.5776
54.5	4,193,160	73,556	1.7542	98.2458	0.5653
55.5	3,786,280	83,726	2.2113	97.7887	0.5554
56.5	3,295,178	165,481	5.0219	94.9781	0.5431
57.5	2,603,897	2,899	0.1113	99.8887	0.5159
58.5	2,510,346	63,117	2.5143	97.4857	0.5153
59.5	1,526,861	107,573	7.0453	92.9547	0.5023
60.5	1,253,465	70,325	5.6105	94.3895	0.4669
61.5	1,084,308	49,094	4.5277	95.4723	0.4407
62.5	992,882	38,480	3.8756	96.1244	0.4208
63.5	779,346	21,794	2.7964	97.2036	0.4045
64.5	451,765	16,489	3.6498	96.3502	0.3932
65.5	379,203	35,823	9.4469	90.5531	0.3788
66.5	177,152	8,411	4.7480	95.2520	0.3430
67.5	81,827	4,391	5.3666	94.6334	0.3267
68.5	73,660	2,025	2.7488	97.2512	0.3092
69.5	44,872	617	1.3744	98.6256	0.3007
70.5	41,084	186	0.4522	99.5478	0.2966
71.5	40,898	0	0.0000	100.0000	0.2952
72.5	40,898	24,538	59.9992	40.0008	0.2952
73.5	10,945	0	0.0000	100.0000	0.1181
74.5	6,014	0	0.0000	100.0000	0.1181
75.5	0	0	0.0000	100.0000	0.1181
76.5	0	0	0.0000	100.0000	0.1181
77.5	0	0	0.0000	100.0000	0.1181

Best Fit Curve Results

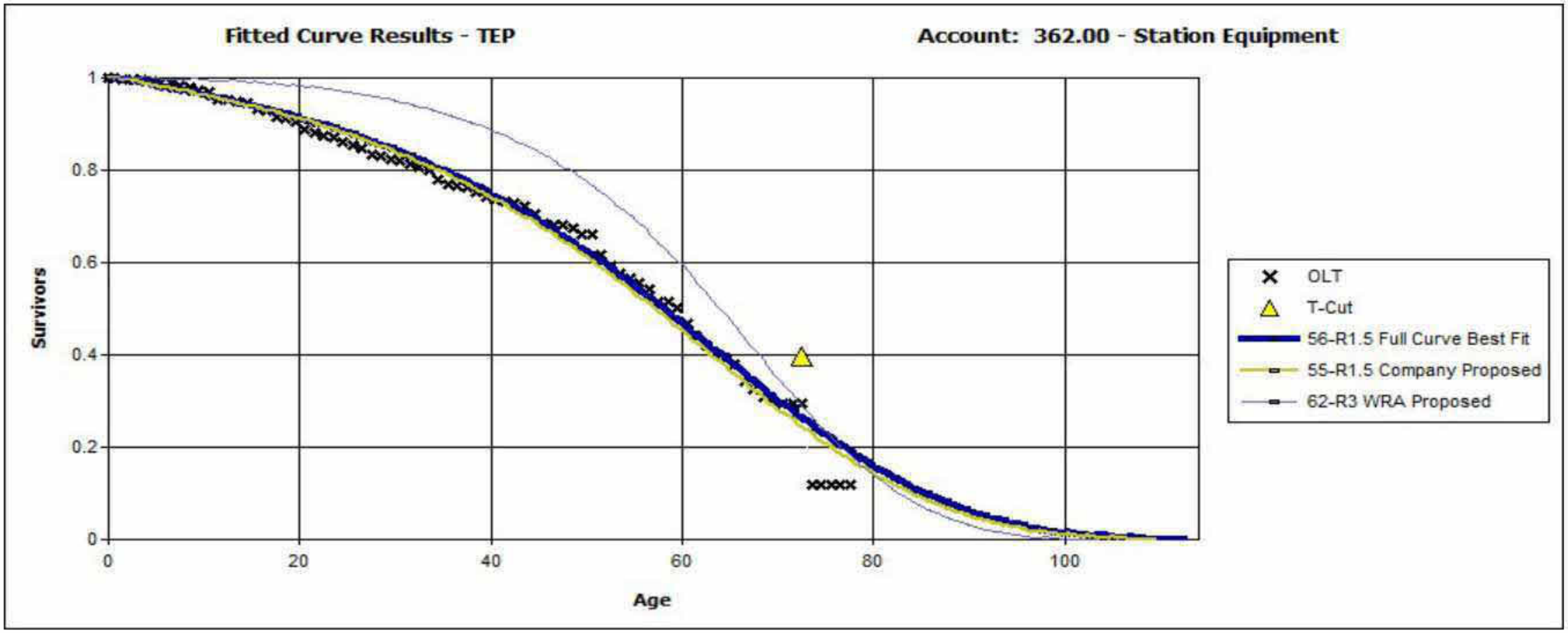
TEP

Account: 362.00 - Station Equipment

Curve	Life	Sum of Squared Differences
BAND	**1939 - 2017**	
R1.5	56.0	184.935
R1	56.0	425.682
S0.5	58.0	463.282
S0	58.0	628.718
R2	56.0	769.022
L1.5	61.0	859.073
L1	62.0	892.754
S1	57.0	901.972
L0.5	64.0	1,252.984
R0.5	58.0	1,496.244
S-0.5	59.0	1,499.078
L2	60.0	1,625.655
S1.5	57.0	1,744.280
L0	66.0	2,086.773
R2.5	56.0	2,152.927
S2	57.0	3,189.385
O1	61.0	3,202.374
O2	69.0	3,225.174
R3	57.0	4,306.281
L3	59.0	4,498.123
S3	58.0	7,068.130
L4	58.0	9,718.615
R4	58.0	10,016.515
O3	70.0	10,937.011
S4	58.0	13,885.406
L5	59.0	16,844.863
R5	59.0	19,454.743
S5	59.0	22,236.492
O4	70.0	27,447.100
S6	59.0	31,304.036
SQ	60.0	51,571.971

Analytical Parameters

OLT Placement Band:	1939 - 2017
OLT Experience Band:	1939 - 2017
Minimum Life Parameter	4
Maximum Life Paramete	70
Life Increment Paramete	1
Max Age (T-Cut):	72.5



Analytical Parameters

OLT Placement Band:	1939 - 2017
OLT Experience Band:	1939 - 2017
Minimum Life Parameter:	4
Maximum Life Parameter:	70
Life Increment Parameter:	1
Max Age (T-Cut):	74.0

TEP

362.00 - Station Equipment

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 62 R3

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	13,900,655	62.00	61.51	224,204	13,789,971
2016	1.5	12,967,090	62.00	60.52	209,147	12,658,200
2015	2.5	6,123,705	62.00	59.54	98,769	5,880,914
2014	3.5	16,292,392	62.00	58.56	262,781	15,389,222
2013	4.5	5,173,289	62.00	57.59	83,440	4,805,030
2012	5.5	6,970,100	62.00	56.61	112,421	6,364,449
2011	6.5	16,599,856	62.00	55.64	267,740	14,897,516
2010	7.5	12,211,946	62.00	54.67	196,967	10,768,927
2009	8.5	17,663,739	62.00	53.71	284,899	15,301,715
2008	9.5	8,931,826	62.00	52.75	144,062	7,598,987
2007	10.5	7,892,295	62.00	51.79	127,295	6,592,687
2006	11.5	2,416,481	62.00	50.84	38,976	1,981,411
2005	12.5	6,906,134	62.00	49.89	111,389	5,556,980
2004	13.5	4,737,129	62.00	48.94	76,405	3,739,515
2003	14.5	7,459,838	62.00	48.00	120,320	5,775,718
2002	15.5	3,859,378	62.00	47.07	62,248	2,929,852
2001	16.5	4,251,160	62.00	46.14	68,567	3,163,509
2000	17.5	7,831,546	62.00	45.21	126,315	5,711,020
1999	18.5	8,061,847	62.00	44.29	130,030	5,759,410
1998	19.5	1,224,613	62.00	43.38	19,752	856,826
1997	20.5	3,221,211	62.00	42.47	51,955	2,206,618
1996	21.5	1,092,356	62.00	41.57	17,619	732,416
1995	22.5	1,030,813	62.00	40.68	16,626	676,272
1994	23.5	2,212,021	62.00	39.79	35,678	1,419,504
1993	24.5	2,027,257	62.00	38.91	32,698	1,272,117
1992	25.5	1,491,120	62.00	38.03	24,050	914,643
1991	26.5	2,357,830	62.00	37.16	38,030	1,413,287
1990	27.5	3,066,309	62.00	36.30	49,457	1,795,405
1989	28.5	1,881,924	62.00	35.45	30,354	1,076,013
1988	29.5	1,875,461	62.00	34.60	30,249	1,046,760

1987	30.5	3,481,946	62.00	33.77	56,160	1,896,344
1986	31.5	835,602	62.00	32.94	13,477	443,904
1985	32.5	2,966,518	62.00	32.12	47,847	1,536,622
1984	33.5	676,502	62.00	31.30	10,911	341,538
1983	34.5	4,531,488	62.00	30.50	73,089	2,228,935
1982	35.5	1,781,291	62.00	29.70	28,731	853,281
1981	36.5	920,640	62.00	28.91	14,849	429,301
1980	37.5	1,735,849	62.00	28.13	27,998	787,627
1979	38.5	2,968,530	62.00	27.36	47,880	1,310,034
1978	39.5	931,771	62.00	26.60	15,029	399,760
1977	40.5	2,369,518	62.00	25.85	38,218	987,863
1976	41.5	4,085,375	62.00	25.11	65,893	1,654,260
1975	42.5	2,971,761	62.00	24.37	47,932	1,168,244
1974	43.5	1,173,886	62.00	23.65	18,934	447,786
1973	44.5	1,194,680	62.00	22.94	19,269	441,998
1972	45.5	2,239,207	62.00	22.24	36,116	803,117
1971	46.5	1,966,174	62.00	21.55	31,712	683,270
1970	47.5	1,210,110	62.00	20.87	19,518	407,289
1969	48.5	2,018,907	62.00	20.20	32,563	657,768
1968	49.5	741,718	62.00	19.54	11,963	233,813
1967	50.5	556,717	62.00	18.90	8,979	169,726
1966	51.5	1,300,830	62.00	18.27	20,981	383,350
1965	52.5	4,814	62.00	17.65	78	1,371
1964	53.5	276,800	62.00	17.05	4,465	76,127
1963	54.5	689,884	62.00	16.46	11,127	183,172
1962	55.5	333,324	62.00	15.89	5,376	85,412
1961	56.5	597,927	62.00	15.33	9,644	147,803
1960	57.5	527,231	62.00	14.78	8,504	125,688
1959	58.5	90,653	62.00	14.25	1,462	20,835
1958	59.5	920,368	62.00	13.73	14,845	203,867
1957	60.5	165,823	62.00	13.23	2,675	35,394
1956	61.5	98,832	62.00	12.75	1,594	20,322
1955	62.5	42,332	62.00	12.28	683	8,384
1954	63.5	175,055	62.00	11.82	2,823	33,387
1953	64.5	305,788	62.00	11.39	4,932	56,155
1952	65.5	56,073	62.00	10.96	904	9,914
1951	66.5	169,869	62.00	10.55	2,740	28,913
1950	67.5	91,430	62.00	10.16	1,475	14,980
1949	68.5	3,776	62.00	9.78	61	595
1948	69.5	26,763	62.00	9.41	432	4,062
1947	70.5	3,172	62.00	9.06	51	463
1946	71.5	0	62.00	8.72	0	0
1945	72.5	0	62.00	8.39	0	0
1944	73.5	5,414	62.00	8.07	87	705
1943	74.5	4,931	62.00	7.76	80	617
1942	75.5	6,014	62.00	7.46	97	724
1941	76.5	0	62.00	7.17	0	0

1940	77.5	0	62.00	6.89	0	0
1939	78.5	0	62.00	6.61	0	0
		238,986,611			3,854,623	181,399,618

AVERAGE SERVICE LIFE	62.00
AVERAGE REMAINING LIFE	47.06

Observed Life Table Results

TEP

Account: 365.00 - Overhead Conductors and Devices

Age	Exposures	Retirements	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		**1925 - 2017**			
0	134,554,096	286,256	0.2127	99.7873	1.0000
0.5	154,691,995	695,221	0.4494	99.5506	0.9979
1.5	147,509,571	241,685	0.1638	99.8362	0.9934
2.5	141,679,485	344,331	0.2430	99.7570	0.9918
3.5	134,199,165	229,136	0.1707	99.8293	0.9893
4.5	130,049,010	349,934	0.2691	99.7309	0.9877
5.5	124,322,068	279,216	0.2246	99.7754	0.9850
6.5	116,923,583	280,445	0.2399	99.7601	0.9828
7.5	107,047,067	168,373	0.1573	99.8427	0.9804
8.5	96,963,075	339,030	0.3496	99.6504	0.9789
9.5	95,112,247	156,108	0.1641	99.8359	0.9755
10.5	89,934,198	138,566	0.1541	99.8459	0.9739
11.5	86,718,651	144,568	0.1667	99.8333	0.9724
12.5	84,578,945	139,489	0.1649	99.8351	0.9707
13.5	83,304,639	132,353	0.1589	99.8411	0.9691
14.5	80,981,472	151,894	0.1876	99.8124	0.9676
15.5	78,481,441	140,645	0.1792	99.8208	0.9658
16.5	75,439,799	124,944	0.1656	99.8344	0.9641
17.5	75,208,983	142,045	0.1889	99.8111	0.9625
18.5	71,573,428	618,762	0.8645	99.1355	0.9606
19.5	68,728,405	186,865	0.2719	99.7281	0.9523
20.5	66,474,009	243,367	0.3661	99.6339	0.9498
21.5	65,124,055	203,534	0.3125	99.6875	0.9463
22.5	62,680,288	124,176	0.1981	99.8019	0.9433
23.5	60,398,864	99,597	0.1649	99.8351	0.9414
24.5	58,854,266	91,958	0.1562	99.8438	0.9399
25.5	57,218,359	170,016	0.2971	99.7029	0.9384
26.5	54,968,445	131,918	0.2400	99.7600	0.9356
27.5	52,786,838	81,825	0.1550	99.8450	0.9334
28.5	50,232,199	128,694	0.2562	99.7438	0.9319
29.5	48,266,674	130,661	0.2707	99.7293	0.9296
30.5	45,967,140	66,017	0.1436	99.8564	0.9270
31.5	43,048,980	77,830	0.1808	99.8192	0.9257
32.5	38,946,304	103,703	0.2663	99.7337	0.9240
33.5	36,418,645	106,187	0.2916	99.7084	0.9216
34.5	33,974,295	124,551	0.3666	99.6334	0.9189
35.5	30,793,652	49,232	0.1599	99.8401	0.9155
36.5	27,405,560	62,600	0.2284	99.7716	0.9141
37.5	24,696,328	59,996	0.2429	99.7571	0.9120
38.5	22,708,992	83,073	0.3658	99.6342	0.9098

39.5	20,467,472	184,665	0.9022	99.0978	0.9064
40.5	18,762,683	154,933	0.8258	99.1742	0.8982
41.5	17,371,072	105,836	0.6093	99.3907	0.8908
42.5	15,355,400	91,512	0.5960	99.4040	0.8854
43.5	13,238,341	85,453	0.6455	99.3545	0.8801
44.5	11,886,899	142,958	1.2026	98.7974	0.8744
45.5	10,978,128	95,753	0.8722	99.1278	0.8639
46.5	9,781,486	75,615	0.7730	99.2270	0.8564
47.5	9,081,080	163,932	1.8052	98.1948	0.8498
48.5	8,231,084	174,278	2.1173	97.8827	0.8344
49.5	7,676,339	135,386	1.7637	98.2363	0.8168
50.5	7,245,575	182,263	2.5155	97.4845	0.8024
51.5	6,511,590	137,377	2.1097	97.8903	0.7822
52.5	5,931,812	126,822	2.1380	97.8620	0.7657
53.5	5,266,699	264,574	5.0235	94.9765	0.7493
54.5	4,127,078	302,828	7.3376	92.6624	0.7117
55.5	3,249,257	228,071	7.0192	92.9808	0.6594
56.5	2,726,297	654,022	23.9894	76.0106	0.6132
57.5	1,839,823	687,755	37.3816	62.6184	0.4661
58.5	913,831	394,848	43.2081	56.7919	0.2918
59.5	565,465	173,244	30.6374	69.3626	0.1657
60.5	381,860	95,136	24.9140	75.0860	0.1150
61.5	285,916	61,698	21.5790	78.4210	0.0863
62.5	223,562	127,993	57.2519	42.7481	0.0677
63.5	95,369	48,197	50.5372	49.4628	0.0289
64.5	75,003	24,709	32.9436	67.0564	0.0143
65.5	50,196	7,662	15.2644	84.7356	0.0096
66.5	42,073	6,101	14.5018	85.4982	0.0081
67.5	35,502	4,214	11.8700	88.1300	0.0070
68.5	30,938	3,062	9.8964	90.1036	0.0061
69.5	26,999	7,950	29.4438	70.5562	0.0055
70.5	18,964	1,790	9.4363	90.5637	0.0039
71.5	17,030	4,353	25.5617	74.4383	0.0035
72.5	12,677	1,855	14.6329	85.3671	0.0026
73.5	10,822	1,376	12.7162	87.2838	0.0022
74.5	9,446	2,421	25.6258	74.3742	0.0020
75.5	7,025	797	11.3382	88.6618	0.0015
76.5	6,229	1,599	25.6701	74.3299	0.0013
77.5	4,630	719	15.5354	84.4646	0.0010
78.5	3,880	857	22.0922	77.9078	0.0008
79.5	3,023	2,211	73.1466	26.8534	0.0006
80.5	812	236	29.0941	70.9059	0.0002
81.5	576	130	22.5903	77.4097	0.0001
82.5	446	181	40.6760	59.3240	0.0001
83.5	264	264	100.0000	0.0000	0.0001
84.5	0	0	0.0000	100.0000	0.0000
85.5	0	0	0.0000	100.0000	0.0000

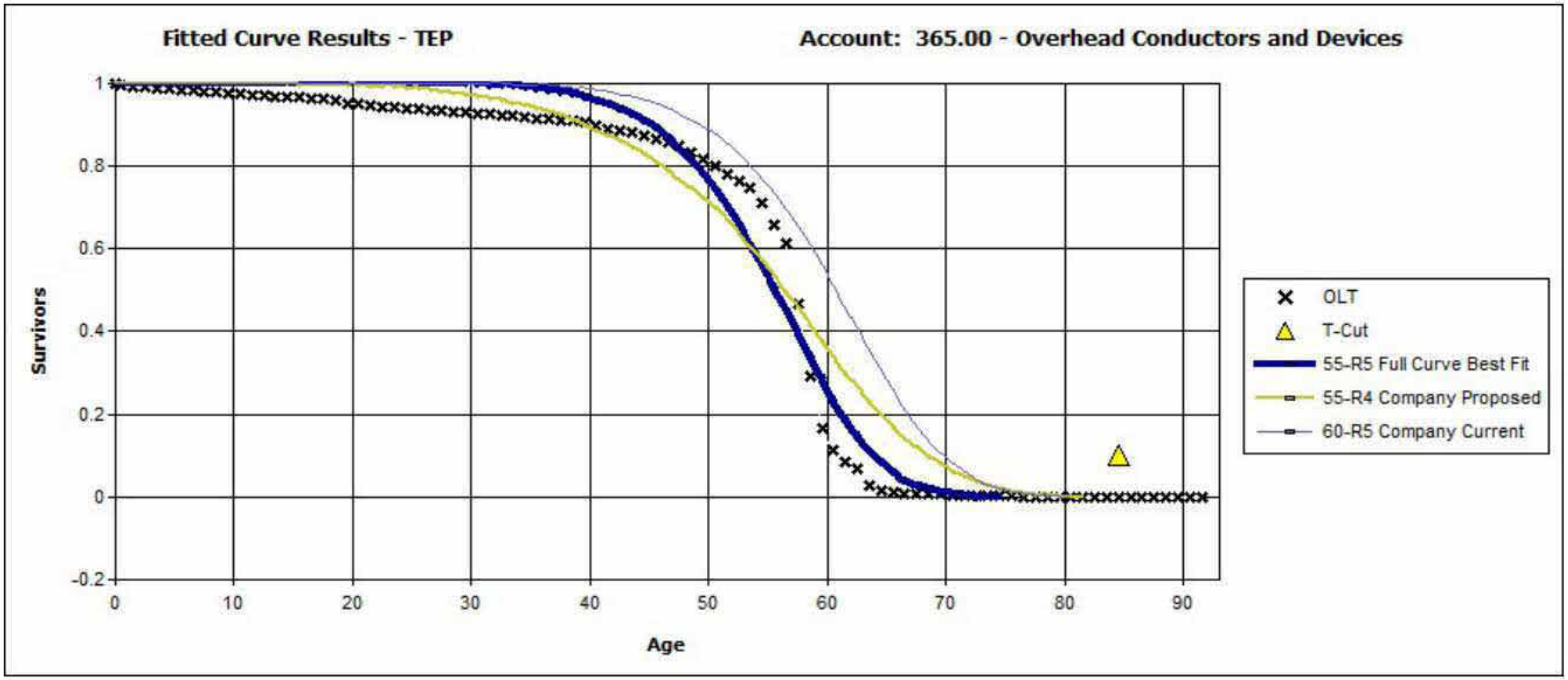
86.5	0	0	0.0000	100.0000	0.0000
87.5	0	0	0.0000	100.0000	0.0000
88.5	0	0	0.0000	100.0000	0.0000
89.5	0	0	0.0000	100.0000	0.0000
90.5	0	0	0.0000	100.0000	0.0000
91.5	0	0	0.0000	100.0000	0.0000

Best Fit Curve Results
TEP
Account: 365.00 - Overhead Conductors and Devices

Curve	Life	Sum of Squared Differences
BAND	**1925 - 2017**	
R5	55.0	2,947.024
S5	56.0	3,385.744
S6	56.0	3,409.701
L5	56.0	4,543.798
R4	54.0	4,940.903
S4	55.0	5,333.671
L4	56.0	8,311.756
R3	53.0	9,196.006
S3	54.0	9,556.352
SQ	57.0	11,188.160
R2.5	52.0	12,454.908
S2	53.0	14,784.664
L3	56.0	16,653.798
R2	51.0	16,656.066
S1.5	53.0	18,071.231
R1.5	51.0	21,549.589
S1	52.0	22,088.611
L2	55.0	25,731.160
S0.5	51.0	26,418.219
R1	50.0	27,424.835
L1.5	55.0	30,101.053
S0	51.0	31,430.321
L1	54.0	35,355.614
R0.5	49.0	35,576.414
S-0.5	50.0	37,899.529
L0.5	54.0	39,990.204
L0	55.0	45,305.870
O1	48.0	45,420.011
O2	56.0	48,083.914
O3	74.0	61,294.863
O4	100.0	66,218.443

Analytical Parameters

OLT Placement Band:	1925 - 2017
OLT Experience Band:	1925 - 2017
Minimum Life Paramet	4
Maximum Life Parame	100
Life Increment Parame	1
Max Age (T-Cut):	84.5



Analytical Parameters

OLT Placement Band:	1925 - 2017
OLT Experience Band:	1925 - 2017
Minimum Life Parameter:	4
Maximum Life Parameter:	100
Life Increment Parameter:	1
Max Age (T-Cut):	84.5

TEP

365.00 - Overhead Conductors and Devices

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 60 R5

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	6,496,074	60.00	59.50	108,268	6,441,853
2016	1.5	11,738,535	60.00	58.50	195,642	11,444,915
2015	2.5	11,347,073	60.00	57.50	189,118	10,874,127
2014	3.5	9,743,195	60.00	56.50	162,387	9,174,711
2013	4.5	7,366,863	60.00	55.50	122,781	6,814,249
2012	5.5	8,659,330	60.00	54.50	144,322	7,865,443
2011	6.5	10,991,139	60.00	53.50	183,186	9,800,286
2010	7.5	12,343,397	60.00	52.50	205,723	10,800,307
2009	8.5	12,090,528	60.00	51.50	201,509	10,377,542
2008	9.5	4,050,509	60.00	50.50	67,508	3,409,124
2007	10.5	6,813,132	60.00	49.50	113,552	5,620,743
2006	11.5	4,264,098	60.00	48.50	71,068	3,446,756
2005	12.5	4,072,100	60.00	47.50	67,868	3,223,691
2004	13.5	3,423,984	60.00	46.50	57,066	2,653,542
2003	14.5	3,661,528	60.00	45.50	61,025	2,776,610
2002	15.5	4,061,849	60.00	44.50	67,697	3,012,483
2001	16.5	4,234,625	60.00	43.50	70,577	3,070,046
2000	17.5	1,338,266	60.00	42.50	22,304	947,921
1999	18.5	4,449,675	60.00	41.50	74,161	3,077,633
1998	19.5	2,854,493	60.00	40.50	47,575	1,926,744
1997	20.5	2,439,076	60.00	39.50	40,651	1,605,692
1996	21.5	1,755,181	60.00	38.50	29,253	1,126,218
1995	22.5	2,820,777	60.00	37.50	47,013	1,762,951
1994	23.5	2,898,455	60.00	36.50	48,308	1,763,198
1993	24.5	2,693,805	60.00	35.50	44,897	1,593,821
1992	25.5	2,633,919	60.00	34.50	43,899	1,514,517
1991	26.5	2,715,905	60.00	33.50	45,265	1,516,446
1990	27.5	2,511,991	60.00	32.50	41,867	1,360,806
1989	28.5	2,900,349	60.00	31.51	48,339	1,523,006
1988	29.5	2,612,410	60.00	30.51	43,540	1,328,479

1987	30.5	2,601,685	60.00	29.52	43,361	1,279,977
1986	31.5	3,267,829	60.00	28.53	54,464	1,553,806
1985	32.5	4,183,441	60.00	27.54	69,724	1,920,419
1984	33.5	2,629,455	60.00	26.56	43,824	1,164,057
1983	34.5	2,660,272	60.00	25.59	44,338	1,134,453
1982	35.5	3,185,515	60.00	24.62	53,092	1,306,990
1981	36.5	3,453,609	60.00	23.66	57,560	1,361,656
1980	37.5	2,760,826	60.00	22.70	46,014	1,044,691
1979	38.5	2,008,682	60.00	21.76	33,478	728,505
1978	39.5	2,379,210	60.00	20.83	39,653	825,911
1977	40.5	1,620,033	60.00	19.91	27,001	537,514
1976	41.5	1,283,757	60.00	19.00	21,396	406,490
1975	42.5	1,929,561	60.00	18.10	32,159	582,179
1974	43.5	2,030,988	60.00	17.22	33,850	582,965
1973	44.5	1,266,677	60.00	16.36	21,111	345,293
1972	45.5	792,585	60.00	15.51	13,210	204,840
1971	46.5	1,106,875	60.00	14.68	18,448	270,749
1970	47.5	642,968	60.00	13.86	10,716	148,577
1969	48.5	694,211	60.00	13.08	11,570	151,283
1968	49.5	444,979	60.00	12.31	7,416	91,293
1967	50.5	301,010	60.00	11.57	5,017	58,034
1966	51.5	577,821	60.00	10.85	9,630	104,518
1965	52.5	446,494	60.00	10.17	7,442	75,657
1964	53.5	536,710	60.00	9.51	8,945	85,051
1963	54.5	878,213	60.00	8.88	14,637	129,971
1962	55.5	581,785	60.00	8.28	9,696	80,311
1961	56.5	296,000	60.00	7.71	4,933	38,058
1960	57.5	236,451	60.00	7.18	3,941	28,286
1959	58.5	238,486	60.00	6.67	3,975	26,518
1958	59.5	60,719	60.00	6.19	1,012	6,269
1957	60.5	10,698	60.00	5.75	178	1,025
1956	61.5	1,142	60.00	5.33	19	101
1955	62.5	760	60.00	4.94	13	63
1954	63.5	199	60.00	4.58	3	15
1953	64.5	(27,831)	60.00	4.24	(464)	(1,966)
1952	65.5	98	60.00	3.93	2	6
1951	66.5	461	60.00	3.64	8	28
1950	67.5	469	60.00	3.38	8	26
1949	68.5	350	60.00	3.15	6	18
1948	69.5	877	60.00	2.93	15	43
1947	70.5	85	60.00	2.73	1	4
1946	71.5	145	60.00	2.54	2	6
1945	72.5	0	60.00	2.35	0	0
1944	73.5	0	60.00	2.13	0	0
1943	74.5	0	60.00	1.90	0	0
1942	75.5	(0)	60.00	1.66	(0)	(0)
1941	76.5	0	60.00	1.41	0	0

1940	77.5	0	60.00	1.18	0	0
1939	78.5	30	60.00	0.97	1	0
1938	79.5	0	60.00	0.75	0	0
1937	80.5	0	60.00	0.59	0	0
1936	81.5	0	60.00	0.50	0	0
1935	82.5	0	60.00	0.50	0	0
1934	83.5	0	60.00	0.50	0	0
1933	84.5	0	60.00	0.50	0	0
1932	85.5	0	60.00	0.50	0	0
1931	86.5	0	60.00	0.50	0	0
1930	87.5	0	60.00	0.50	0	0
1929	88.5	0	60.00	0.50	0	0
1928	89.5	0	60.00	0.50	0	0
1927	90.5	0	60.00	0.50	0	0
1926	91.5	0	60.00	0.50	0	0
1925	92.5	0	60.00	0.50	0	0
		205,066,591			3,417,777	148,127,552

AVERAGE SERVICE LIFE 60.00

AVERAGE REMAINING LIFE 43.34

Observed Life Table Results
TEP
Account: 366.00 - Underground Conduits

Age	Exposures	Retirements	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		**1940 - 2017**			
0	39,294,946	23,004	0.0585	99.9415	1.0000
0.5	47,269,520	79,853	0.1689	99.8311	0.9994
1.5	47,421,976	50,908	0.1074	99.8926	0.9977
2.5	48,123,534	49,163	0.1022	99.8978	0.9967
3.5	46,806,351	41,192	0.0880	99.9120	0.9956
4.5	45,875,781	42,493	0.0926	99.9074	0.9948
5.5	45,081,003	55,670	0.1235	99.8765	0.9938
6.5	43,923,790	46,199	0.1052	99.8948	0.9926
7.5	44,060,938	76,797	0.1743	99.8257	0.9916
8.5	43,818,425	66,294	0.1513	99.8487	0.9898
9.5	43,180,166	41,173	0.0954	99.9046	0.9883
10.5	43,079,711	56,729	0.1317	99.8683	0.9874
11.5	42,229,671	34,200	0.0810	99.9190	0.9861
12.5	42,049,018	112,237	0.2669	99.7331	0.9853
13.5	42,292,986	54,315	0.1284	99.8716	0.9827
14.5	42,481,386	51,138	0.1204	99.8796	0.9814
15.5	42,177,865	20,935	0.0496	99.9504	0.9802
16.5	42,089,767	18,347	0.0436	99.9564	0.9797
17.5	41,268,998	19,769	0.0479	99.9521	0.9793
18.5	37,930,414	135,806	0.3580	99.6420	0.9788
19.5	36,506,813	12,040	0.0330	99.9670	0.9753
20.5	34,486,601	14,319	0.0415	99.9585	0.9750
21.5	32,541,045	22,329	0.0686	99.9314	0.9746
22.5	30,735,839	8,262	0.0269	99.9731	0.9739
23.5	29,005,383	5,322	0.0183	99.9817	0.9737
24.5	27,007,123	8,080	0.0299	99.9701	0.9735
25.5	25,859,531	46,536	0.1800	99.8200	0.9732
26.5	24,529,869	6,916	0.0282	99.9718	0.9715
27.5	22,934,293	25,008	0.1090	99.8910	0.9712
28.5	21,395,593	50,126	0.2343	99.7657	0.9701
29.5	19,722,337	13,015	0.0660	99.9340	0.9679
30.5	16,875,265	23,505	0.1393	99.8607	0.9672
31.5	14,597,278	8,805	0.0603	99.9397	0.9659
32.5	12,093,719	12,719	0.1052	99.8948	0.9653
33.5	10,934,651	6,259	0.0572	99.9428	0.9643
34.5	9,923,451	5,887	0.0593	99.9407	0.9637
35.5	8,772,730	2,982	0.0340	99.9660	0.9631
36.5	8,293,033	5,931	0.0715	99.9285	0.9628
37.5	7,326,197	8,340	0.1138	99.8862	0.9621
38.5	6,615,925	5,626	0.0850	99.9150	0.9610

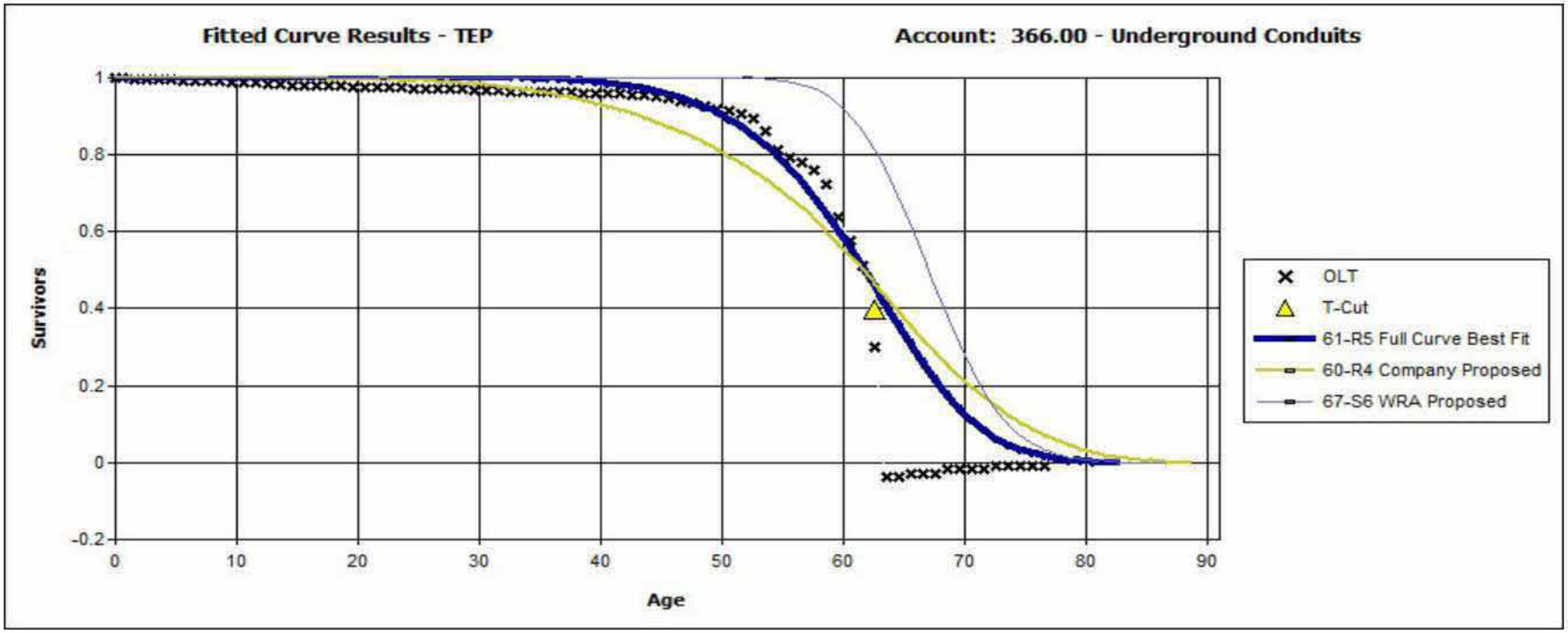
39.5	6,277,026	6,273	0.0999	99.9001	0.9602
40.5	5,649,450	3,615	0.0640	99.9360	0.9593
41.5	5,605,929	11,186	0.1995	99.8005	0.9586
42.5	5,015,857	13,266	0.2645	99.7355	0.9567
43.5	3,941,679	14,062	0.3567	99.6433	0.9542
44.5	3,167,603	11,909	0.3760	99.6240	0.9508
45.5	2,349,276	16,070	0.6841	99.3159	0.9472
46.5	1,328,286	7,740	0.5827	99.4173	0.9407
47.5	1,321,106	11,237	0.8506	99.1494	0.9353
48.5	1,170,840	9,086	0.7760	99.2240	0.9273
49.5	987,922	7,021	0.7107	99.2893	0.9201
50.5	931,814	8,027	0.8615	99.1385	0.9136
51.5	905,133	11,354	1.2544	98.7456	0.9057
52.5	859,546	30,326	3.5281	96.4719	0.8943
53.5	824,526	48,372	5.8666	94.1334	0.8628
54.5	746,599	19,076	2.5551	97.4449	0.8122
55.5	391,782	5,493	1.4019	98.5981	0.7914
56.5	340,899	9,432	2.7668	97.2332	0.7803
57.5	294,242	13,920	4.7309	95.2691	0.7587
58.5	237,694	27,713	11.6590	88.3410	0.7228
59.5	176,959	17,176	9.7060	90.2940	0.6386
60.5	138,116	15,750	11.4036	88.5964	0.5766
61.5	107,548	44,715	41.5769	58.4231	0.5108
62.5	43,944	49,473	112.5832	-12.5832	0.2984
63.5	-37,216	609	-1.6362	101.6362	-0.0376
64.5	122	32	25.9536	74.0464	-0.0382
65.5	90	0	0.0000	100.0000	-0.0283
66.5	90	0	0.0000	100.0000	-0.0283
67.5	90	33	36.8101	63.1899	-0.0283
68.5	57	4	6.8265	93.1735	-0.0179
69.5	25	0	0.0000	100.0000	-0.0166
70.5	25	0	0.0000	100.0000	-0.0166
71.5	25	11	45.0079	54.9921	-0.0166
72.5	14	0	0.0000	100.0000	-0.0092
73.5	14	0	0.0000	100.0000	-0.0092
74.5	14	3	22.3731	77.6269	-0.0092
75.5	0	0	0.0000	100.0000	-0.0071
76.5	0	0	0.0000	100.0000	-0.0071

Best Fit Curve Results
TEP
Account: 366.00 - Underground Conduits

Curve	Life	Sum of Squared Differences
BAND	**1940 - 2017**	
R5	61.0	695.659
L5	63.0	724.503
S5	61.0	765.986
S4	63.0	1,043.143
S6	61.0	1,125.881
L4	65.0	1,221.269
R4	63.0	1,554.782
S3	67.0	1,811.111
L3	72.0	2,022.684
R3	67.0	2,593.641
S2	72.0	2,662.587
L2	83.0	3,046.799
S1.5	76.0	3,183.705
R2.5	71.0	3,350.918
S1	82.0	3,690.320
L1.5	91.0	3,755.500
R2	77.0	4,082.426
S0.5	90.0	4,291.121
L1	100.0	4,307.602
S0	100.0	4,824.173
R1.5	87.0	4,941.998
R1	100.0	5,600.181
L0.5	100.0	5,706.175
S-0.5	100.0	6,426.150
R0.5	100.0	6,944.749
L0	100.0	8,087.543
SQ	61.0	8,734.593
O1	100.0	9,345.183
O2	100.0	11,666.160
O3	100.0	25,124.511
O4	100.0	46,435.001

Analytical Parameters

OLT Placement Band:	1940 - 2017
OLT Experience Band:	1940 - 2017
Minimum Life Paramet	6
Maximum Life Parame	100
Life Increment Parame	1
Max Age (T-Cut):	62.5



Analytical Parameters

OLT Placement Band:	1940 - 2017
OLT Experience Band:	1940 - 2017
Minimum Life Parameter:	6
Maximum Life Parameter:	100
Life Increment Parameter:	1
Max Age (T-Cut):	62.5

TEP

366.00 - Underground Conduits

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 67 S6

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	2,878,057	67.00	66.50	42,956	2,856,562
2016	1.5	2,920,507	67.00	65.50	43,590	2,855,105
2015	2.5	2,051,546	67.00	64.50	30,620	1,974,983
2014	3.5	2,562,442	67.00	63.50	38,245	2,428,568
2013	4.5	1,983,663	67.00	62.50	29,607	1,850,420
2012	5.5	2,219,028	67.00	61.50	33,120	2,036,856
2011	6.5	1,636,016	67.00	60.50	24,418	1,477,288
2010	7.5	912,397	67.00	59.50	13,618	810,258
2009	8.5	901,436	67.00	58.50	13,454	787,069
2008	9.5	940,614	67.00	57.50	14,039	807,238
2007	10.5	832,112	67.00	56.50	12,420	701,702
2006	11.5	841,146	67.00	55.50	12,554	696,765
2005	12.5	754,562	67.00	54.50	11,262	613,781
2004	13.5	740,740	67.00	53.50	11,056	591,482
2003	14.5	540,417	67.00	52.50	8,066	423,458
2002	15.5	1,080,605	67.00	51.50	16,128	830,608
2001	16.5	1,094,592	67.00	50.50	16,337	825,022
2000	17.5	856,127	67.00	49.50	12,778	632,506
1999	18.5	3,460,952	67.00	48.50	51,656	2,505,295
1998	19.5	1,486,112	67.00	47.50	22,181	1,053,578
1997	20.5	2,304,437	67.00	46.50	34,395	1,599,335
1996	21.5	1,752,037	67.00	45.50	26,150	1,189,806
1995	22.5	1,778,811	67.00	44.50	26,549	1,181,438
1994	23.5	1,729,918	67.00	43.50	25,820	1,123,146
1993	24.5	2,028,852	67.00	42.50	30,281	1,286,947
1992	25.5	1,542,902	67.00	41.50	23,028	955,669
1991	26.5	1,341,341	67.00	40.50	20,020	810,803
1990	27.5	1,642,029	67.00	39.50	24,508	968,052
1989	28.5	1,566,642	67.00	38.50	23,383	900,225
1988	29.5	1,666,988	67.00	37.50	24,880	933,006

1987	30.5	2,862,072	67.00	36.50	42,717	1,559,172
1986	31.5	2,276,397	67.00	35.50	33,976	1,206,137
1985	32.5	2,520,155	67.00	34.50	37,614	1,297,677
1984	33.5	1,220,870	67.00	33.50	18,222	610,428
1983	34.5	1,069,811	67.00	32.50	15,967	518,932
1982	35.5	1,188,661	67.00	31.50	17,741	558,841
1981	36.5	476,780	67.00	30.50	7,116	217,039
1980	37.5	962,985	67.00	29.50	14,373	423,995
1979	38.5	703,355	67.00	28.50	10,498	299,184
1978	39.5	338,090	67.00	27.50	5,046	138,766
1977	40.5	623,568	67.00	26.50	9,307	246,631
1976	41.5	41,299	67.00	25.50	616	15,718
1975	42.5	579,520	67.00	24.50	8,650	211,911
1974	43.5	1,060,975	67.00	23.50	15,835	372,127
1973	44.5	760,014	67.00	22.50	11,343	255,224
1972	45.5	806,829	67.00	21.50	12,042	258,904
1971	46.5	1,005,079	67.00	20.50	15,001	307,522
1970	47.5	(22)	67.00	19.50	(0)	(6)
1969	48.5	139,030	67.00	18.50	2,075	38,391
1968	49.5	173,832	67.00	17.50	2,595	45,412
1967	50.5	49,086	67.00	16.51	733	12,094
1966	51.5	18,654	67.00	15.51	278	4,319
1965	52.5	34,233	67.00	14.53	511	7,423
1964	53.5	4,695	67.00	13.55	70	950
1963	54.5	29,555	67.00	12.59	441	5,553
1962	55.5	373,437	67.00	11.65	5,574	64,914
1961	56.5	45,390	67.00	10.73	677	7,271
1960	57.5	37,226	67.00	9.85	556	5,474
1959	58.5	42,627	67.00	9.02	636	5,736
1958	59.5	33,023	67.00	8.22	493	4,054
1957	60.5	21,667	67.00	7.49	323	2,422
1956	61.5	14,817	67.00	6.81	221	1,506
1955	62.5	18,889	67.00	6.19	282	1,745
1954	63.5	37,898	67.00	5.62	566	3,181
1953	64.5	(5,664)	67.00	5.11	(85)	(432)
1952	65.5	0	67.00	4.66	0	0
1951	66.5	0	67.00	4.25	0	0
1950	67.5	0	67.00	3.88	0	0
1949	68.5	0	67.00	3.56	0	0
1948	69.5	28	67.00	3.27	0	1
1947	70.5	0	67.00	3.01	0	0
1946	71.5	0	67.00	2.77	0	0
1945	72.5	0	67.00	2.57	0	0
1944	73.5	0	67.00	2.38	0	0
1943	74.5	0	67.00	2.21	0	0
1942	75.5	11	67.00	2.06	0	0
1941	76.5	0	67.00	1.93	0	0

1940	77.5	0	67.00	1.79	0	0
		67,611,897			1,009,133	46,415,188

AVERAGE SERVICE LIFE 67.00
AVERAGE REMAINING LIFE 46.00

Observed Life Table Results

TEP

Account: 368 UG - Line Transformers - UG

Age	Exposures	Retirements	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		1920 - 2017			
0	107,454,729	990,380	0.9217	99.0783	1.0000
0.5	116,063,626	1,730,375	1.4909	98.5091	0.9908
1.5	112,310,612	344,652	0.3069	99.6931	0.9760
2.5	116,689,410	356,045	0.3051	99.6949	0.9730
3.5	116,495,126	304,662	0.2615	99.7385	0.9700
4.5	115,909,133	243,230	0.2098	99.7902	0.9675
5.5	115,447,425	287,187	0.2488	99.7512	0.9655
6.5	112,963,098	244,779	0.2167	99.7833	0.9631
7.5	109,124,772	229,599	0.2104	99.7896	0.9610
8.5	104,605,593	264,520	0.2529	99.7471	0.9590
9.5	100,447,729	186,264	0.1854	99.8146	0.9565
10.5	94,961,410	178,879	0.1884	99.8116	0.9548
11.5	86,124,829	184,471	0.2142	99.7858	0.9530
12.5	83,777,080	218,132	0.2604	99.7396	0.9509
13.5	82,155,345	202,633	0.2466	99.7534	0.9485
14.5	79,554,543	273,550	0.3439	99.6561	0.9461
15.5	75,341,074	206,309	0.2738	99.7262	0.9429
16.5	69,560,772	239,060	0.3437	99.6563	0.9403
17.5	67,199,695	258,453	0.3846	99.6154	0.9370
18.5	65,433,948	248,454	0.3797	99.6203	0.9334
19.5	62,947,870	268,222	0.4261	99.5739	0.9299
20.5	59,591,648	301,766	0.5064	99.4936	0.9259
21.5	54,983,404	310,888	0.5654	99.4346	0.9213
22.5	48,477,449	257,725	0.5316	99.4684	0.9160
23.5	44,631,469	268,498	0.6016	99.3984	0.9112
24.5	41,712,596	384,757	0.9224	99.0776	0.9057
25.5	39,062,754	437,412	1.1198	98.8802	0.8973
26.5	35,439,693	418,604	1.1812	98.8188	0.8873
27.5	31,424,936	415,974	1.3237	98.6763	0.8768
28.5	27,112,571	339,758	1.2531	98.7469	0.8652
29.5	22,468,717	240,696	1.0713	98.9287	0.8544
30.5	18,883,332	238,334	1.2621	98.7379	0.8452
31.5	16,474,911	236,366	1.4347	98.5653	0.8345
32.5	13,890,809	432,900	3.1164	96.8836	0.8226
33.5	11,740,618	409,737	3.4899	96.5101	0.7969
34.5	10,655,399	258,639	2.4273	97.5727	0.7691
35.5	10,500,895	186,608	1.7771	98.2229	0.7504
36.5	9,580,422	119,421	1.2465	98.7535	0.7371
37.5	8,458,160	92,694	1.0959	98.9041	0.7279
38.5	7,080,192	128,538	1.8155	98.1845	0.7199

39.5	5,749,994	86,941	1.5120	98.4880	0.7069
40.5	4,939,487	87,797	1.7775	98.2225	0.6962
41.5	4,222,341	76,904	1.8214	98.1786	0.6838
42.5	3,745,947	49,878	1.3315	98.6685	0.6714
43.5	2,667,070	49,829	1.8683	98.1317	0.6624
44.5	1,597,000	69,924	4.3784	95.6216	0.6500
45.5	763,505	21,271	2.7860	97.2140	0.6216
46.5	289,648	6,969	2.4062	97.5938	0.6043
47.5	118,633	5,582	4.7050	95.2950	0.5897
48.5	99,634	2,996	3.0074	96.9926	0.5620
49.5	77,824	5,997	7.7053	92.2947	0.5451
50.5	68,585	3,690	5.3799	94.6201	0.5031
51.5	54,538	830	1.5215	98.4785	0.4760
52.5	54,024	1,054	1.9507	98.0493	0.4688
53.5	33,116	1,071	3.2340	96.7660	0.4596
54.5	33,294	2,913	8.7479	91.2521	0.4448
55.5	32,041	1,143	3.5675	96.4325	0.4059
56.5	20,398	253	1.2422	98.7578	0.3914
57.5	16,562	1,436	8.6700	91.3300	0.3865
58.5	12,786	197	1.5410	98.4590	0.3530
59.5	16,827	79	0.4679	99.5321	0.3476
60.5	15,576	787	5.0541	94.9459	0.3459
61.5	14,317	87	0.6046	99.3954	0.3285
62.5	14,542	1,264	8.6893	91.3107	0.3265
63.5	13,278	352	2.6526	97.3474	0.2981
64.5	8,589	1,488	17.3244	82.6756	0.2902
65.5	7,101	0	0.0000	100.0000	0.2399
66.5	7,101	84	1.1828	98.8172	0.2399
67.5	6,209	636	10.2403	89.7597	0.2371
68.5	6	0	0.0000	100.0000	0.2128
69.5	0	0	0.0000	100.0000	0.2128
70.5	0	0	0.0000	100.0000	0.2128
71.5	0	0	0.0000	100.0000	0.2128
72.5	0	0	0.0000	100.0000	0.2128
73.5	0	0	0.0000	100.0000	0.2128
74.5	0	0	0.0000	100.0000	0.2128
75.5	0	0	0.0000	100.0000	0.2128
76.5	0	0	0.0000	100.0000	0.2128
77.5	0	0	0.0000	100.0000	0.2128
78.5	0	0	0.0000	100.0000	0.2128
79.5	1,268	0	0.0000	100.0000	0.2128
80.5	1,268	0	0.0000	100.0000	0.2128
81.5	1,268	0	0.0000	100.0000	0.2128
82.5	1,268	1,268	100.0000	0.0000	0.2128
83.5	0	0	0.0000	100.0000	0.0000
84.5	0	0	0.0000	100.0000	0.0000
85.5	0	0	0.0000	100.0000	0.0000

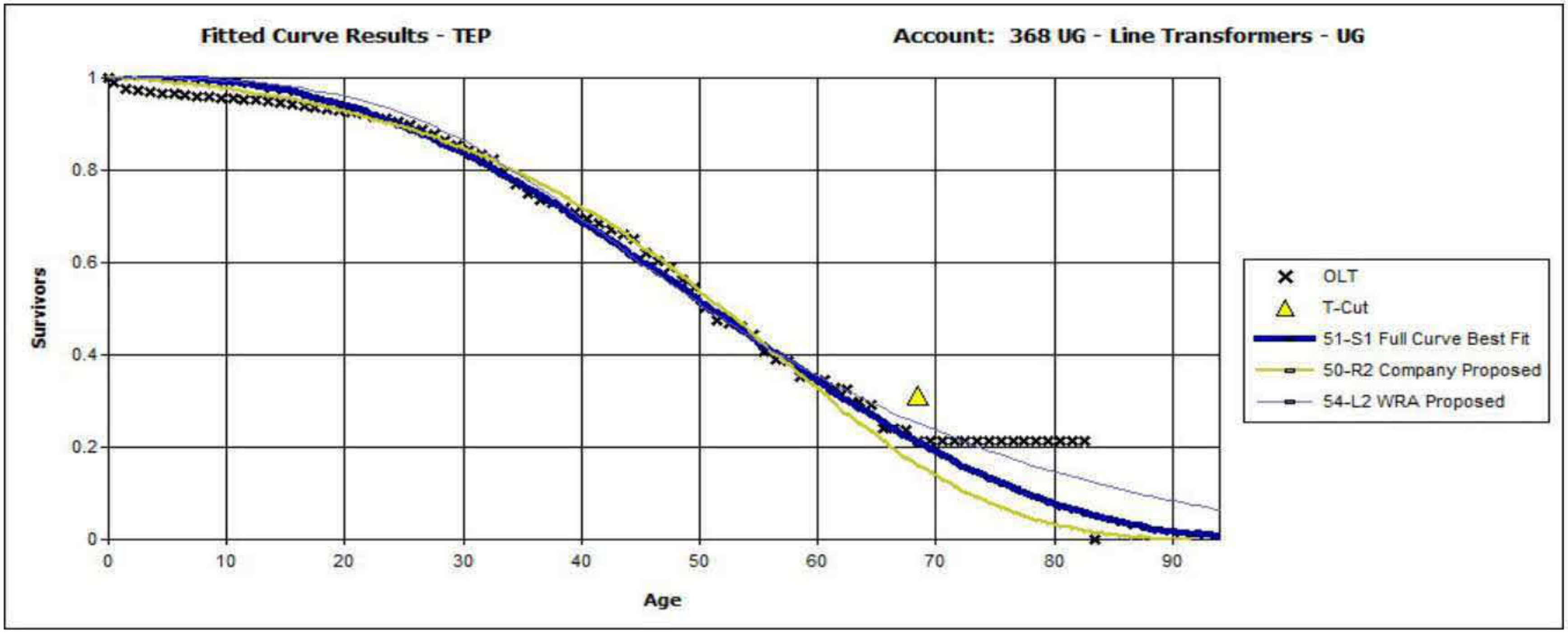
86.5	0	0	0.0000	100.0000	0.0000
87.5	0	0	0.0000	100.0000	0.0000
88.5	0	0	0.0000	100.0000	0.0000
89.5	0	0	0.0000	100.0000	0.0000
90.5	0	0	0.0000	100.0000	0.0000
91.5	0	0	0.0000	100.0000	0.0000
92.5	0	0	0.0000	100.0000	0.0000
93.5	0	0	0.0000	100.0000	0.0000
94.5	0	0	0.0000	100.0000	0.0000
95.5	0	0	0.0000	100.0000	0.0000
96.5	0	0	0.0000	100.0000	0.0000

Best Fit Curve Results
TEP
Account: 368 UG - Line Transformers - UG

Curve	Life	Sum of Squared Differences
BAND	**1920 - 2017**	
S1	51.0	262.832
R2	50.0	309.092
R1.5	50.0	318.580
L2	54.0	428.304
S0.5	52.0	486.543
S1.5	51.0	525.057
L1.5	54.0	540.871
R1	50.0	1,153.217
R2.5	51.0	1,158.136
S0	52.0	1,283.285
L1	55.0	1,359.607
S2	51.0	1,379.935
L3	53.0	2,018.905
L0.5	57.0	2,357.297
R3	51.0	2,822.806
S-0.5	53.0	2,886.754
R0.5	51.0	2,906.932
L0	59.0	3,800.195
S3	52.0	4,451.698
O1	54.0	5,304.091
O2	61.0	5,355.815
L4	52.0	6,554.437
O3	80.0	7,566.382
R4	52.0	7,887.530
S4	52.0	10,811.208
L5	52.0	13,326.364
O4	80.0	15,363.899
R5	52.0	16,663.737
S5	52.0	18,999.762
S6	52.0	27,271.797
SQ	51.0	45,827.390

Analytical Parameters

OLT Placement Band:	1920 - 2017
OLT Experience Band:	1920 - 2017
Minimum Life Parameter	3
Maximum Life Paramete	80
Life Increment Paramete	1
Max Age (T-Cut):	67.5



Analytical Parameters

OLT Placement Band:	1920 - 2017
OLT Experience Band:	1999 - 2017
Minimum Life Parameter:	3
Maximum Life Parameter:	80
Life Increment Parameter:	1
Max Age (T-Cut):	70.0

TEP

368 UG - Line Transformers - UG

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 54 L2

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	3,783,737	54.00	53.49	70,069	3,748,144
2016	1.5	4,618,412	54.00	52.49	85,526	4,489,559
2015	2.5	6,161,136	54.00	51.50	114,095	5,875,689
2014	3.5	4,426,843	54.00	50.51	81,979	4,140,591
2013	4.5	3,272,820	54.00	49.53	60,608	3,001,605
2012	5.5	3,480,168	54.00	48.55	64,448	3,128,939
2011	6.5	3,996,162	54.00	47.58	74,003	3,521,399
2010	7.5	4,152,096	54.00	46.63	76,891	3,585,373
2009	8.5	4,681,387	54.00	45.69	86,692	3,960,589
2008	9.5	8,731,794	54.00	44.75	161,700	7,236,584
2007	10.5	10,316,809	54.00	43.83	191,052	8,374,330
2006	11.5	14,180,937	54.00	42.92	262,610	11,272,375
2005	12.5	8,215,758	54.00	42.03	152,144	6,394,355
2004	13.5	6,806,029	54.00	41.14	126,038	5,185,787
2003	14.5	6,074,460	54.00	40.27	112,490	4,530,425
2002	15.5	5,941,794	54.00	39.42	110,033	4,337,010
2001	16.5	6,991,685	54.00	38.57	129,476	4,993,725
2000	17.5	4,650,870	54.00	37.73	86,127	3,249,921
1999	18.5	4,253,342	54.00	36.91	78,766	2,907,351
1998	19.5	5,442,753	54.00	36.10	100,792	3,638,904
1997	20.5	5,986,385	54.00	35.31	110,859	3,914,664
1996	21.5	5,453,515	54.00	34.54	100,991	3,488,366
1995	22.5	5,753,174	54.00	33.79	106,540	3,600,277
1994	23.5	2,776,176	54.00	33.07	51,411	1,700,045
1993	24.5	3,201,845	54.00	32.37	59,293	1,919,253
1992	25.5	2,546,397	54.00	31.70	47,155	1,494,645
1991	26.5	2,336,282	54.00	31.05	43,264	1,343,392
1990	27.5	3,161,055	54.00	30.43	58,538	1,781,514
1989	28.5	3,859,551	54.00	29.84	71,473	2,133,063
1988	29.5	3,895,028	54.00	29.28	72,130	2,112,124

1987	30.5	4,065,240	54.00	28.75	75,282	2,164,093
1986	31.5	2,841,753	54.00	28.24	52,625	1,485,936
1985	32.5	2,977,778	54.00	27.75	55,144	1,530,294
1984	33.5	2,122,943	54.00	27.29	39,314	1,072,835
1983	34.5	1,751,038	54.00	26.85	32,427	870,664
1982	35.5	1,098,103	54.00	26.43	20,335	537,520
1981	36.5	1,602,694	54.00	26.04	29,680	772,716
1980	37.5	1,556,932	54.00	25.66	28,832	739,725
1979	38.5	1,505,336	54.00	25.29	27,877	705,127
1978	39.5	1,245,817	54.00	24.95	23,071	575,589
1977	40.5	755,266	54.00	24.62	13,986	344,317
1976	41.5	639,699	54.00	24.30	11,846	287,873
1975	42.5	416,610	54.00	24.00	7,715	185,125
1974	43.5	1,029,796	54.00	23.70	19,070	451,988
1973	44.5	1,045,454	54.00	23.42	19,360	453,352
1972	45.5	765,746	54.00	23.14	14,180	328,148
1971	46.5	457,092	54.00	22.87	8,465	193,609
1970	47.5	183,633	54.00	22.61	3,401	76,891
1969	48.5	18,015	54.00	22.35	334	7,458
1968	49.5	22,836	54.00	22.10	423	9,347
1967	50.5	7,738	54.00	21.85	143	3,132
1966	51.5	12,925	54.00	21.61	239	5,172
1965	52.5	763	54.00	21.37	14	302
1964	53.5	21,117	54.00	21.13	391	8,262
1963	54.5	0	54.00	20.89	0	0
1962	55.5	3,030	54.00	20.65	56	1,159
1961	56.5	10,499	54.00	20.41	194	3,968
1960	57.5	4,345	54.00	20.17	80	1,623
1959	58.5	3,232	54.00	19.93	60	1,193
1958	59.5	3,228	54.00	19.69	60	1,177
1957	60.5	1,178	54.00	19.44	22	424
1956	61.5	472	54.00	19.20	9	168
1955	62.5	1,177	54.00	18.96	22	413
1954	63.5	0	54.00	18.71	0	0
1953	64.5	4,337	54.00	18.46	80	1,483
1952	65.5	0	54.00	18.21	0	0
1951	66.5	0	54.00	17.97	0	0
1950	67.5	808	54.00	17.72	15	265
1949	68.5	5,567	54.00	17.46	103	1,801
1948	69.5	0	54.00	17.21	0	0
1947	70.5	0	54.00	16.96	0	0
1946	71.5	0	54.00	16.71	0	0
1945	72.5	0	54.00	16.46	0	0
1944	73.5	0	54.00	16.20	0	0
1943	74.5	0	54.00	15.95	0	0
1942	75.5	0	54.00	15.70	0	0
1941	76.5	0	54.00	15.45	0	0

1940	77.5	0	54.00	15.20	0	0
1939	78.5	0	54.00	14.95	0	0
1938	79.5	0	54.00	14.70	0	0
1937	80.5	0	54.00	14.46	0	0
1936	81.5	0	54.00	14.21	0	0
1935	82.5	0	54.00	13.97	0	0
1934	83.5	0	54.00	13.73	0	0
1933	84.5	0	54.00	13.49	0	0
1932	85.5	0	54.00	13.25	0	0
1931	86.5	0	54.00	13.01	0	0
1930	87.5	0	54.00	12.78	0	0
1929	88.5	0	54.00	12.54	0	0
1928	89.5	0	54.00	12.31	0	0
1927	90.5	0	54.00	12.08	0	0
1926	91.5	0	54.00	11.85	0	0
1925	92.5	0	54.00	11.63	0	0
1924	93.5	0	54.00	11.41	0	0
1923	94.5	0	54.00	11.18	0	0
1922	95.5	0	54.00	10.96	0	0
1921	96.5	0	54.00	10.74	0	0
1920	97.5	0	54.00	10.53	0	0
		185,330,599			3,432,048	133,883,147

AVERAGE SERVICE LIFE	54.00
AVERAGE REMAINING LIFE	39.01

Observed Life Table Results

TEP

Account: 369.00 UG - Services - Underground

Age	Exposures	Retiremen	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		**1920 - 2017**			
0	61,709,617	172	0.0003	99.9997	1.0000
0.5	82,302,113	1,791	0.0022	99.9978	1.0000
1.5	79,875,503	175	0.0002	99.9998	1.0000
2.5	76,420,033	1,804	0.0024	99.9976	1.0000
3.5	73,814,825	777	0.0011	99.9989	0.9999
4.5	71,255,743	579	0.0008	99.9992	0.9999
5.5	68,857,539	117	0.0002	99.9998	0.9999
6.5	66,987,343	0	0.0000	100.0000	0.9999
7.5	65,713,877	0	0.0000	100.0000	0.9999
8.5	62,924,002	393	0.0006	99.9994	0.9999
9.5	59,572,170	7,565	0.0127	99.9873	0.9999
10.5	57,118,781	0	0.0000	100.0000	0.9998
11.5	55,545,584	1	0.0000	100.0000	0.9998
12.5	52,509,004	10	0.0000	100.0000	0.9998
13.5	46,667,385	236	0.0005	99.9995	0.9998
14.5	44,838,738	62	0.0001	99.9999	0.9998
15.5	42,083,682	24	0.0001	99.9999	0.9998
16.5	39,176,661	60	0.0002	99.9998	0.9998
17.5	32,739,609	70	0.0002	99.9998	0.9998
18.5	30,700,799	27,971	0.0911	99.9089	0.9998
19.5	28,259,590	111,611	0.3949	99.6051	0.9989
20.5	28,994,072	33,811	0.1166	99.8834	0.9949
21.5	27,933,686	74	0.0003	99.9997	0.9938
22.5	27,284,090	731	0.0027	99.9973	0.9938
23.5	26,339,950	706	0.0027	99.9973	0.9937
24.5	25,214,030	97	0.0004	99.9996	0.9937
25.5	24,187,099	402	0.0017	99.9983	0.9937
26.5	23,656,025	4,304	0.0182	99.9818	0.9937
27.5	23,067,436	4,378	0.0190	99.9810	0.9935
28.5	23,063,487	688	0.0030	99.9970	0.9933
29.5	21,785,502	695	0.0032	99.9968	0.9933
30.5	20,139,424	1,598	0.0079	99.9921	0.9933
31.5	18,076,847	1,681	0.0093	99.9907	0.9932
32.5	16,288,686	2,787	0.0171	99.9829	0.9931
33.5	14,498,902	1,732	0.0119	99.9881	0.9929
34.5	13,389,169	2,978	0.0222	99.9778	0.9928
35.5	12,310,886	6,024	0.0489	99.9511	0.9926
36.5	11,043,888	5,923	0.0536	99.9464	0.9921
37.5	9,969,300	8,056	0.0808	99.9192	0.9916
38.5	7,697,871	5,711	0.0742	99.9258	0.9908

39.5	6,534,804	5,327	0.0815	99.9185	0.9900
40.5	4,731,874	5,700	0.1205	99.8795	0.9892
41.5	3,498,185	12,824	0.3666	99.6334	0.9880
42.5	3,033,640	7,529	0.2482	99.7518	0.9844
43.5	2,443,026	7,111	0.2911	99.7089	0.9820
44.5	1,645,992	10,136	0.6158	99.3842	0.9791
45.5	954,102	11,123	1.1658	98.8342	0.9731
46.5	442,522	7,070	1.5978	98.4022	0.9617
47.5	204,904	6,156	3.0042	96.9958	0.9464
48.5	142,746	5,013	3.5117	96.4883	0.9179
49.5	98,704	2,967	3.0059	96.9941	0.8857
50.5	83,397	2,774	3.3260	96.6740	0.8591
51.5	89,173	3,037	3.4061	96.5939	0.8305
52.5	86,857	2,180	2.5100	97.4900	0.8022
53.5	75,988	2,445	3.2173	96.7827	0.7821
54.5	66,101	1,258	1.9031	98.0969	0.7569
55.5	56,823	1,552	2.7315	97.2685	0.7425
56.5	48,905	2,483	5.0781	94.9219	0.7222
57.5	44,114	1,157	2.6229	97.3771	0.6856
58.5	39,728	1,348	3.3935	96.6065	0.6676
59.5	37,406	259	0.6926	99.3074	0.6449
60.5	39,007	801	2.0537	97.9463	0.6405
61.5	38,010	493	1.2967	98.7033	0.6273
62.5	39,280	1,255	3.1956	96.8044	0.6192
63.5	37,012	58	0.1575	99.8425	0.5994
64.5	36,392	2,861	7.8619	92.1381	0.5984
65.5	34,857	2,537	7.2786	92.7214	0.5514
66.5	30,087	946	3.1457	96.8543	0.5113
67.5	29,510	5,205	17.6377	82.3623	0.4952
68.5	22,460	2,685	11.9567	88.0433	0.4078
69.5	13,744	163	1.1849	98.8151	0.3591
70.5	15,433	328	2.1272	97.8728	0.3548
71.5	14,945	2,846	19.0410	80.9590	0.3473
72.5	12,099	2,940	24.2962	75.7038	0.2811
73.5	9,160	3,198	34.9102	65.0898	0.2128
74.5	5,962	2,249	37.7234	62.2766	0.1385
75.5	3,707	3,451	93.0891	6.9109	0.0863
76.5	689	18	2.6007	97.3993	0.0060
77.5	595	10	1.6528	98.3472	0.0058
78.5	586	439	74.9793	25.0207	0.0057
79.5	30,574	0	0.0000	100.0000	0.0014
80.5	30,574	0	0.0000	100.0000	0.0014
81.5	30,574	10,920	35.7156	64.2844	0.0014
82.5	19,654	0	0.0000	100.0000	0.0009
83.5	19,654	0	0.0000	100.0000	0.0009
84.5	19,654	9,423	47.9448	52.0552	0.0009
85.5	10,231	1,642	16.0509	83.9491	0.0005

86.5	8,589	1,368	15.9294	84.0706	0.0004
87.5	7,221	0	0.0000	100.0000	0.0003
88.5	7,221	0	-0.0004	100.0004	0.0003
89.5	7,221	1,164	16.1196	83.8804	0.0003
90.5	6,057	682	11.2560	88.7440	0.0003
91.5	5,375	377	7.0119	92.9881	0.0003
92.5	4,998	460	9.2006	90.7994	0.0002
93.5	4,538	529	11.6581	88.3419	0.0002
94.5	4,009	403	10.0426	89.9574	0.0002
95.5	3,607	128	3.5618	96.4382	0.0002
96.5	3,478	276	7.9362	92.0638	0.0002
BAND		**1997 - 2017**			
0	61,709,617	172	0.0003	99.9997	1.0000
0.5	82,302,113	1,791	0.0022	99.9978	1.0000
1.5	79,875,503	175	0.0002	99.9998	1.0000
2.5	76,420,033	1,804	0.0024	99.9976	1.0000
3.5	73,814,825	777	0.0011	99.9989	0.9999
4.5	71,255,743	579	0.0008	99.9992	0.9999
5.5	68,857,539	117	0.0002	99.9998	0.9999
6.5	66,987,343	0	0.0000	100.0000	0.9999
7.5	65,713,877	0	0.0000	100.0000	0.9999
8.5	62,924,002	393	0.0006	99.9994	0.9999
9.5	59,572,170	7,565	0.0127	99.9873	0.9999
10.5	57,118,781	0	0.0000	100.0000	0.9998
11.5	55,545,584	1	0.0000	100.0000	0.9998
12.5	52,509,004	10	0.0000	100.0000	0.9998
13.5	46,667,385	236	0.0005	99.9995	0.9998
14.5	44,838,738	62	0.0001	99.9999	0.9998
15.5	42,083,682	24	0.0001	99.9999	0.9998
16.5	39,176,661	60	0.0002	99.9998	0.9998
17.5	32,739,609	70	0.0002	99.9998	0.9998
18.5	30,700,799	27,971	0.0911	99.9089	0.9998
19.5	28,259,590	111,611	0.3949	99.6051	0.9989
20.5	28,994,072	33,811	0.1166	99.8834	0.9949
21.5	27,933,686	74	0.0003	99.9997	0.9938
22.5	27,284,090	731	0.0027	99.9973	0.9938
23.5	26,339,950	706	0.0027	99.9973	0.9937
24.5	25,214,030	97	0.0004	99.9996	0.9937
25.5	24,187,099	402	0.0017	99.9983	0.9937
26.5	23,656,025	4,304	0.0182	99.9818	0.9937
27.5	23,067,436	4,378	0.0190	99.9810	0.9935
28.5	23,063,487	688	0.0030	99.9970	0.9933
29.5	21,785,502	695	0.0032	99.9968	0.9933
30.5	20,139,424	1,598	0.0079	99.9921	0.9933
31.5	18,076,847	1,681	0.0093	99.9907	0.9932
32.5	16,288,686	2,787	0.0171	99.9829	0.9931
33.5	14,498,902	1,732	0.0119	99.9881	0.9929

34.5	13,389,169	2,978	0.0222	99.9778	0.9928
35.5	12,310,886	6,024	0.0489	99.9511	0.9926
36.5	11,043,888	5,923	0.0536	99.9464	0.9921
37.5	9,969,300	8,056	0.0808	99.9192	0.9916
38.5	7,697,871	5,711	0.0742	99.9258	0.9908
39.5	6,534,804	5,327	0.0815	99.9185	0.9900
40.5	4,731,874	5,700	0.1205	99.8795	0.9892
41.5	3,498,185	12,824	0.3666	99.6334	0.9880
42.5	3,033,640	7,529	0.2482	99.7518	0.9844
43.5	2,443,026	7,111	0.2911	99.7089	0.9820
44.5	1,645,992	10,136	0.6158	99.3842	0.9791
45.5	954,102	11,123	1.1658	98.8342	0.9731
46.5	442,522	7,070	1.5978	98.4022	0.9617
47.5	204,904	6,156	3.0042	96.9958	0.9464
48.5	142,746	5,013	3.5117	96.4883	0.9179
49.5	98,704	2,967	3.0059	96.9941	0.8857
50.5	83,397	2,774	3.3260	96.6740	0.8591
51.5	89,173	3,037	3.4061	96.5939	0.8305
52.5	86,857	2,180	2.5100	97.4900	0.8022
53.5	75,988	2,445	3.2173	96.7827	0.7821
54.5	66,101	1,258	1.9031	98.0969	0.7569
55.5	56,823	1,552	2.7315	97.2685	0.7425
56.5	48,905	2,483	5.0781	94.9219	0.7222
57.5	44,114	1,157	2.6229	97.3771	0.6856
58.5	39,728	1,348	3.3935	96.6065	0.6676
59.5	37,406	259	0.6926	99.3074	0.6449
60.5	39,007	801	2.0537	97.9463	0.6405
61.5	38,010	493	1.2967	98.7033	0.6273
62.5	39,280	1,255	3.1956	96.8044	0.6192
63.5	37,012	58	0.1575	99.8425	0.5994
64.5	36,392	2,861	7.8619	92.1381	0.5984
65.5	34,857	2,537	7.2786	92.7214	0.5514
66.5	30,087	946	3.1457	96.8543	0.5113
67.5	29,510	5,205	17.6377	82.3623	0.4952
68.5	22,460	2,685	11.9567	88.0433	0.4078
69.5	13,744	163	1.1849	98.8151	0.3591
70.5	15,433	328	2.1272	97.8728	0.3548
71.5	14,945	2,846	19.0410	80.9590	0.3473
72.5	12,099	2,940	24.2962	75.7038	0.2811
73.5	9,160	3,198	34.9102	65.0898	0.2128
74.5	5,962	2,249	37.7234	62.2766	0.1385
75.5	3,707	3,451	93.0891	6.9109	0.0863
76.5	689	18	2.6007	97.3993	0.0060
77.5	595	10	1.6528	98.3472	0.0058
78.5	586	439	74.9793	25.0207	0.0057
79.5	30,574	0	0.0000	100.0000	0.0014
80.5	30,574	0	0.0000	100.0000	0.0014

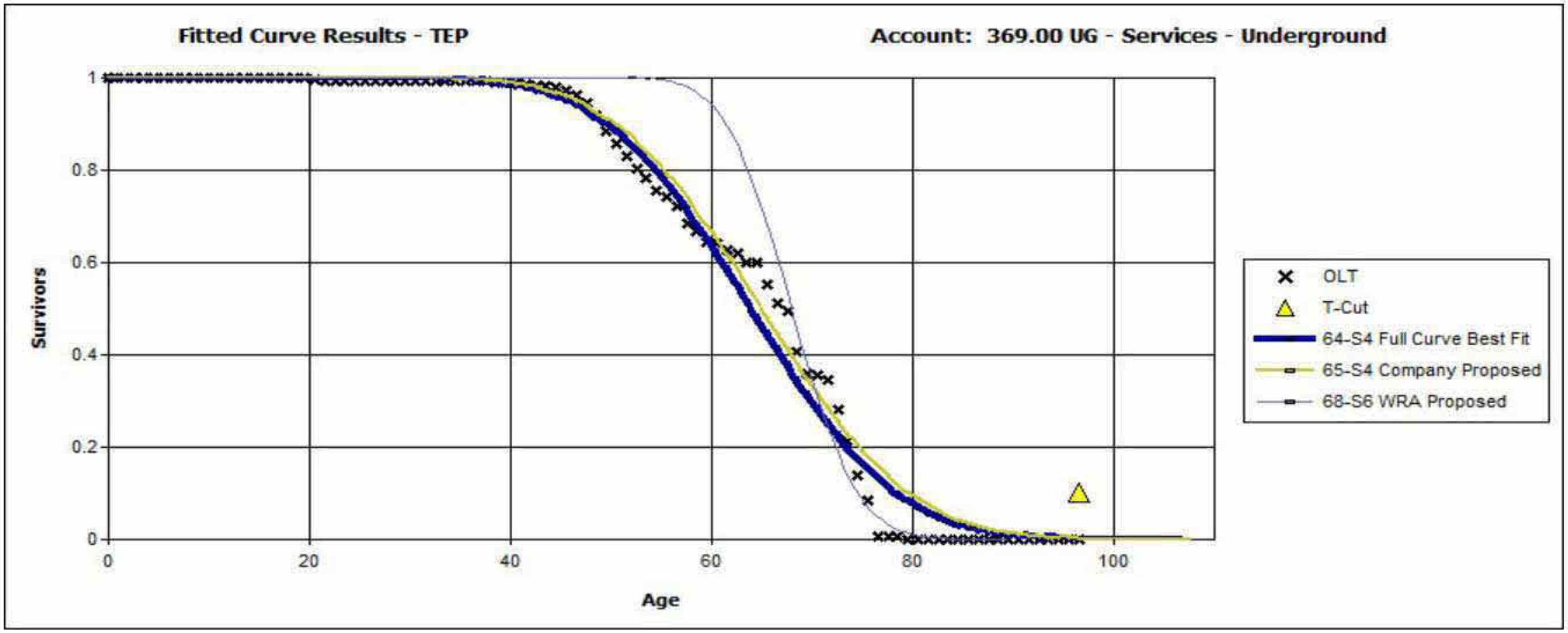
81.5	30,574	10,920	35.7156	64.2844	0.0014
82.5	19,654	0	0.0000	100.0000	0.0009
83.5	19,654	0	0.0000	100.0000	0.0009
84.5	19,654	9,423	47.9448	52.0552	0.0009
85.5	10,231	1,642	16.0509	83.9491	0.0005
86.5	8,589	1,368	15.9294	84.0706	0.0004
87.5	7,221	0	0.0000	100.0000	0.0003
88.5	7,221	0	-0.0004	100.0004	0.0003
89.5	7,221	1,164	16.1196	83.8804	0.0003
90.5	6,057	682	11.2560	88.7440	0.0003
91.5	5,375	377	7.0119	92.9881	0.0003
92.5	4,998	460	9.2006	90.7994	0.0002
93.5	4,538	529	11.6581	88.3419	0.0002
94.5	4,009	403	10.0426	89.9574	0.0002
95.5	3,607	128	3.5618	96.4382	0.0002
96.5	3,478	276	7.9362	92.0638	0.0002

Best Fit Curve Results
TEP
Account: 369.00 UG - Services - Underground

Curve	Life	Sum of Squared Differences
BAND	**1920 - 2017**	
S4	64.0	1,593.884
R4	63.0	1,610.807
R5	65.0	1,942.286
L5	65.0	2,500.777
S5	65.0	3,270.032
L4	65.0	3,925.397
S3	64.0	4,459.290
R3	62.0	5,331.848
S6	66.0	8,360.109
R2.5	61.0	9,154.866
S2	63.0	10,217.671
L3	65.0	11,442.388
R2	60.0	14,083.027
S1.5	62.0	14,343.528
S1	62.0	19,351.255
R1.5	60.0	20,150.622
L2	66.0	22,027.964
S0.5	61.0	24,890.877
SQ	67.0	26,265.604
R1	59.0	27,493.487
L1.5	65.0	27,883.594
S0	60.0	31,366.254
L1	65.0	34,800.834
R0.5	58.0	37,543.588
S-0.5	59.0	39,750.917
L0.5	65.0	40,764.202
L0	66.0	47,482.825
O1	58.0	49,467.896
O2	67.0	51,613.133
O3	70.0	74,749.873
O4	70.0	104,429.809

Analytical Parameters

OLT Placement Band:	1920 - 2017
OLT Experience Band:	1920 - 2017
Minimum Life Parameter	3
Maximum Life Paramete	70
Life Increment Paramete	1
Max Age (T-Cut):	96.5



Analytical Parameters

OLT Placement Band:	1920 - 2017
OLT Experience Band:	1920 - 2017
Minimum Life Parameter:	3
Maximum Life Parameter:	70
Life Increment Parameter:	1
Max Age (T-Cut):	96.5

TEP

369.00 UG - Services - Underground

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 68 S6

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	4,680,479	68.00	67.50	68,831	4,646,036
2016	1.5	5,859,019	68.00	66.50	86,162	5,729,741
2015	2.5	5,169,971	68.00	65.50	76,029	4,979,868
2014	3.5	4,991,792	68.00	64.50	73,409	4,734,832
2013	4.5	5,108,602	68.00	63.50	75,127	4,770,503
2012	5.5	4,543,363	68.00	62.50	66,814	4,175,859
2011	6.5	3,550,088	68.00	61.50	52,207	3,210,720
2010	7.5	2,892,730	68.00	60.50	42,540	2,573,662
2009	8.5	4,116,155	68.00	59.50	60,532	3,601,612
2008	9.5	4,907,940	68.00	58.50	72,176	4,222,243
2007	10.5	2,813,576	68.00	57.50	41,376	2,379,110
2006	11.5	3,127,752	68.00	56.50	45,996	2,598,775
2005	12.5	4,747,929	68.00	55.50	69,822	3,875,120
2004	13.5	7,960,445	68.00	54.50	117,065	6,380,016
2003	14.5	3,637,235	68.00	53.50	53,489	2,861,626
2002	15.5	4,553,593	68.00	52.50	66,965	3,515,615
2001	16.5	4,022,447	68.00	51.50	59,154	3,046,389
2000	17.5	7,533,998	68.00	50.50	110,794	5,595,058
1999	18.5	3,059,893	68.00	49.50	44,998	2,227,404
1998	19.5	3,755,498	68.00	48.50	55,228	2,678,532
1997	20.5	1,433,545	68.00	47.50	21,082	1,001,365
1996	21.5	2,191,582	68.00	46.50	32,229	1,498,642
1995	22.5	2,456,860	68.00	45.50	36,130	1,643,914
1994	23.5	2,177,911	68.00	44.50	32,028	1,425,238
1993	24.5	1,584,252	68.00	43.50	23,298	1,013,446
1992	25.5	1,620,173	68.00	42.50	23,826	1,012,599
1991	26.5	1,328,381	68.00	41.50	19,535	810,695
1990	27.5	1,271,346	68.00	40.50	18,696	757,191
1989	28.5	515,282	68.00	39.50	7,578	299,315
1988	29.5	1,520,646	68.00	38.50	22,362	860,945

1987	30.5	1,710,965	68.00	37.50	25,161	943,537
1986	31.5	2,118,448	68.00	36.50	31,154	1,137,096
1985	32.5	1,808,487	68.00	35.50	26,595	944,126
1984	33.5	1,797,532	68.00	34.50	26,434	911,973
1983	34.5	1,115,196	68.00	33.50	16,400	549,391
1982	35.5	1,093,190	68.00	32.50	16,076	522,474
1981	36.5	1,276,620	68.00	31.50	18,774	591,368
1980	37.5	1,082,349	68.00	30.50	15,917	485,459
1979	38.5	2,276,984	68.00	29.50	33,485	987,796
1978	39.5	1,161,995	68.00	28.50	17,088	487,006
1977	40.5	1,803,860	68.00	27.50	26,527	729,492
1976	41.5	1,232,512	68.00	26.50	18,125	480,310
1975	42.5	458,300	68.00	25.50	6,740	171,860
1974	43.5	585,951	68.00	24.50	8,617	211,111
1973	44.5	793,038	68.00	23.50	11,662	274,060
1972	45.5	684,008	68.00	22.50	10,059	226,323
1971	46.5	504,499	68.00	21.50	7,419	159,509
1970	47.5	233,409	68.00	20.50	3,432	70,366
1969	48.5	60,696	68.00	19.50	893	17,406
1968	49.5	42,474	68.00	18.50	625	11,556
1967	50.5	16,397	68.00	17.50	241	4,221
1966	51.5	3,597	68.00	16.51	53	873
1965	52.5	2,966	68.00	15.52	44	677
1964	53.5	10,828	68.00	14.53	159	2,314
1963	54.5	9,152	68.00	13.56	135	1,825
1962	55.5	8,204	68.00	12.60	121	1,520
1961	56.5	6,366	68.00	11.66	94	1,092
1960	57.5	2,496	68.00	10.75	37	395
1959	58.5	3,356	68.00	9.88	49	487
1958	59.5	2,437	68.00	9.05	36	324
1957	60.5	3,896	68.00	8.26	57	473
1956	61.5	1,445	68.00	7.53	21	160
1955	62.5	2,014	68.00	6.86	30	203
1954	63.5	1,934	68.00	6.24	28	177
1953	64.5	1,093	68.00	5.68	16	91
1952	65.5	1,080	68.00	5.17	16	82
1951	66.5	2,405	68.00	4.72	35	167
1950	67.5	2,476	68.00	4.31	36	157
1949	68.5	1,937	68.00	3.94	28	112
1948	69.5	7,324	68.00	3.61	108	389
1947	70.5	81	68.00	3.32	1	4
1946	71.5	160	68.00	3.06	2	7
1945	72.5	0	68.00	2.83	0	0
1944	73.5	0	68.00	2.62	0	0
1943	74.5	0	68.00	2.43	0	0
1942	75.5	6	68.00	2.27	0	0
1941	76.5	0	68.00	2.10	0	0

1940	77.5	76	68.00	1.98	1	2
1939	78.5	(0)	68.00	1.84	(0)	(0)
1938	79.5	146	68.00	1.73	2	4
1937	80.5	0	68.00	1.61	0	0
1936	81.5	0	68.00	1.52	0	0
1935	82.5	0	68.00	1.42	0	0
1934	83.5	0	68.00	1.33	0	0
1933	84.5	0	68.00	1.24	0	0
1932	85.5	(0)	68.00	1.14	(0)	(0)
1931	86.5	0	68.00	1.05	0	0
1930	87.5	0	68.00	0.92	0	0
1929	88.5	0	68.00	0.87	0	0
1928	89.5	0	68.00	0.79	0	0
1927	90.5	0	68.00	0.50	0	0
1926	91.5	0	68.00	0.50	0	0
1925	92.5	0	68.00	0.50	0	0
1924	93.5	0	68.00	0.50	0	0
1923	94.5	0	68.00	0.50	0	0
1922	95.5	0	68.00	0.50	0	0
1921	96.5	0	68.00	0.50	0	0
1920	97.5	3,202	68.00	0.50	47	24
		129,068,069			1,898,060	98,054,072

AVERAGE SERVICE LIFE	68.00
AVERAGE REMAINING LIFE	51.66

Observed Life Table Results

TEP

Account: 370.00 - Meters

Age	Exposures	Retirements	Retirement Ratio (%)	Survivor Ratio (%)	Cumulative Survivors
BAND		**1910 - 2016**			
0	71,586,102	30,923	0.0432	99.9568	1.0000
0.5	80,834,601	208,276	0.2577	99.7423	0.9996
1.5	74,251,183	680,497	0.9165	99.0835	0.9970
2.5	67,898,535	584,912	0.8614	99.1386	0.9879
3.5	58,158,233	972,517	1.6722	98.3278	0.9793
4.5	54,650,222	1,511,202	2.7652	97.2348	0.9630
5.5	51,498,551	1,770,664	3.4383	96.5617	0.9363
6.5	47,583,387	1,288,893	2.7087	97.2913	0.9041
7.5	44,204,826	2,562,806	5.7976	94.2024	0.8797
8.5	41,766,763	5,523,028	13.2235	86.7765	0.8287
9.5	33,719,463	2,829,159	8.3903	91.6097	0.7191
10.5	31,390,894	2,631,417	8.3827	91.6173	0.6587
11.5	28,640,143	3,224,454	11.2585	88.7415	0.6035
12.5	24,899,751	1,960,148	7.8722	92.1278	0.5356
13.5	24,642,809	1,382,943	5.6120	94.3880	0.4934
14.5	23,729,560	1,107,777	4.6683	95.3317	0.4657
15.5	23,040,996	1,100,238	4.7751	95.2249	0.4440
16.5	22,075,131	1,272,143	5.7628	94.2372	0.4228
17.5	20,443,656	852,527	4.1701	95.8299	0.3984
18.5	18,875,050	2,131,366	11.2920	88.7080	0.3818
19.5	16,412,869	2,595,270	15.8124	84.1876	0.3387
20.5	13,931,190	1,963,020	14.0908	85.9092	0.2851
21.5	12,172,951	737,811	6.0611	93.9389	0.2450
22.5	11,897,657	929,444	7.8120	92.1880	0.2301
23.5	11,333,370	339,257	2.9934	97.0066	0.2121
24.5	11,434,239	624,424	5.4610	94.5390	0.2058
25.5	10,990,263	910,766	8.2870	91.7130	0.1945
26.5	10,164,622	992,579	9.7650	90.2350	0.1784
27.5	9,306,783	753,719	8.0986	91.9014	0.1610
28.5	9,155,338	638,096	6.9697	93.0303	0.1480
29.5	8,249,275	526,284	6.3798	93.6202	0.1377
30.5	7,857,919	832,027	10.5884	89.4116	0.1289
31.5	7,062,253	635,913	9.0044	90.9956	0.1152
32.5	6,214,172	706,889	11.3754	88.6246	0.1048
33.5	5,689,031	746,617	13.1238	86.8762	0.0929
34.5	4,846,082	758,298	15.6477	84.3523	0.0807
35.5	4,368,899	615,486	14.0879	85.9121	0.0681
36.5	3,746,446	551,331	14.7161	85.2839	0.0585
37.5	3,557,477	388,225	10.9129	89.0871	0.0499
38.5	3,226,768	283,980	8.8008	91.1992	0.0444

39.5	2,929,221	337,111	11.5086	88.4914	0.0405
40.5	2,619,991	413,573	15.7853	84.2147	0.0359
41.5	2,209,491	425,509	19.2582	80.7418	0.0302
42.5	1,791,509	333,380	18.6089	81.3911	0.0244
43.5	1,500,750	288,413	19.2179	80.7821	0.0199
44.5	1,283,877	219,797	17.1198	82.8802	0.0160
45.5	1,144,606	173,629	15.1693	84.8307	0.0133
46.5	1,037,102	159,061	15.3371	84.6629	0.0113
47.5	913,177	124,882	13.6755	86.3245	0.0095
48.5	817,426	82,520	10.0951	89.9049	0.0082
49.5	715,408	93,644	13.0897	86.9103	0.0074
50.5	589,145	149,783	25.4238	74.5762	0.0064
51.5	441,650	116,479	26.3737	73.6263	0.0048
52.5	322,523	109,838	34.0560	65.9440	0.0035
53.5	208,801	42,824	20.5093	79.4907	0.0023
54.5	151,031	8,618	5.7063	94.2937	0.0019
55.5	136,758	15,030	10.9900	89.0100	0.0017
56.5	118,829	3,502	2.9475	97.0525	0.0016
57.5	126,633	138,157	109.1001	-9.1001	0.0015
58.5	-1,982	4,400	-221.9572	321.9572	-0.0001
59.5	1,371	2,098	153.0919	-53.0919	-0.0004
60.5	-770	-685	88.9636	11.0364	0.0002
61.5	292	576	197.1461	-97.1461	0.0000
62.5	77	723	944.4256	-844.4256	0.0000
63.5	-573	260	-45.3069	145.3069	0.0002
64.5	-635	100	-15.6875	115.6875	0.0003
65.5	-168	232	-137.8626	237.8626	0.0004
66.5	-174	12	-6.6189	106.6189	0.0009
67.5	48	48	100.0000	0.0000	0.0009
68.5	0	0	0.0000	100.0000	0.0000
69.5	0	0	0.0000	100.0000	0.0000
70.5	0	0	0.0000	100.0000	0.0000
71.5	0	0	0.0000	100.0000	0.0000
72.5	0	0	0.0000	100.0000	0.0000
73.5	0	0	0.0000	100.0000	0.0000
74.5	0	0	0.0000	100.0000	0.0000
75.5	0	0	0.0000	100.0000	0.0000
76.5	0	0	0.0000	100.0000	0.0000
77.5	0	0	0.0000	100.0000	0.0000
78.5	0	0	0.0000	100.0000	0.0000
79.5	0	0	0.0000	100.0000	0.0000
80.5	0	0	0.0000	100.0000	0.0000
81.5	0	0	0.0000	100.0000	0.0000
82.5	0	0	0.0000	100.0000	0.0000
83.5	0	0	0.0000	100.0000	0.0000
84.5	0	0	0.0000	100.0000	0.0000
85.5	0	0	0.0000	100.0000	0.0000

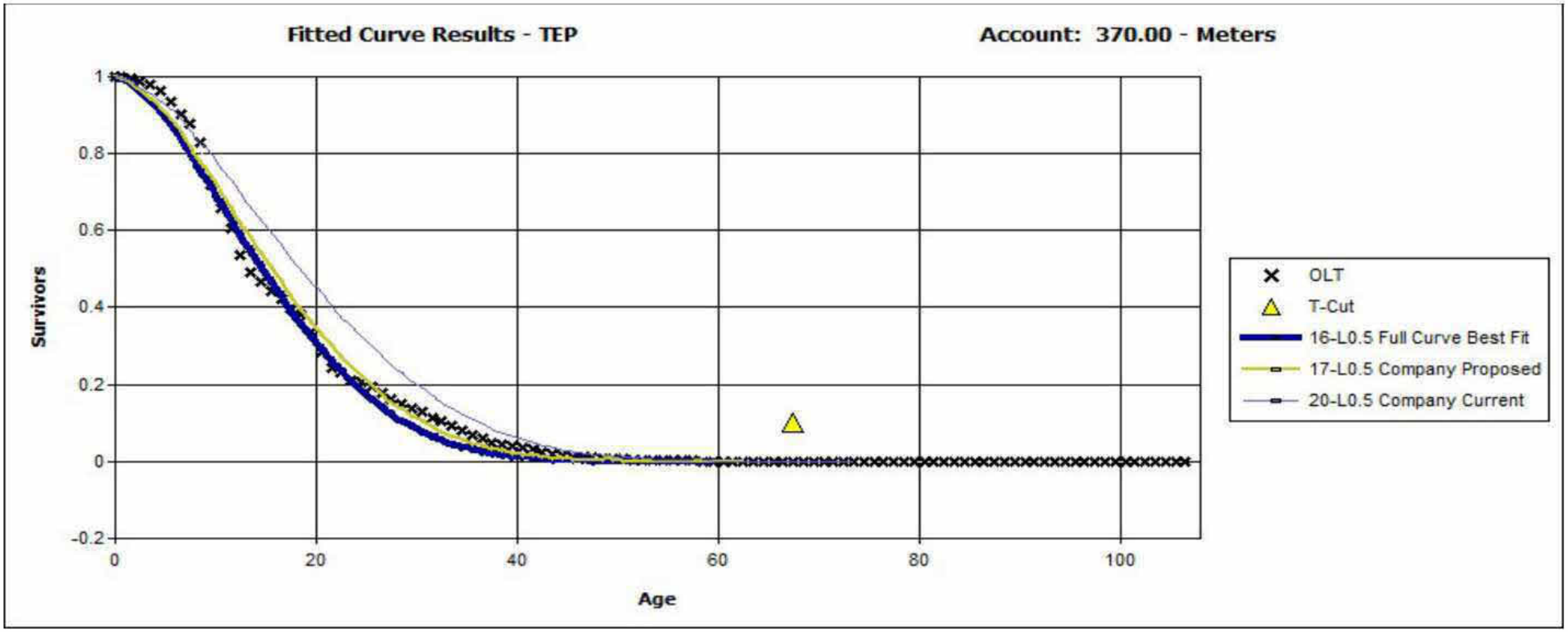
86.5	0	0	0.0000	100.0000	0.0000
87.5	0	0	0.0000	100.0000	0.0000
88.5	0	0	0.0000	100.0000	0.0000
89.5	0	0	0.0000	100.0000	0.0000
90.5	0	0	0.0000	100.0000	0.0000
91.5	0	0	0.0000	100.0000	0.0000
92.5	0	0	0.0000	100.0000	0.0000
93.5	0	465	0.0000	100.0000	0.0000
94.5	-465	0	0.0000	100.0000	0.0000
95.5	-1,041	0	0.0000	100.0000	0.0000
96.5	-1,041	2,068	-198.6445	298.6445	0.0000
97.5	0	0	0.0000	100.0000	0.0000
98.5	0	0	0.0000	100.0000	0.0000
99.5	0	0	0.0000	100.0000	0.0000
100.5	0	0	0.0000	100.0000	0.0000
101.5	0	0	0.0000	100.0000	0.0000
102.5	0	0	0.0000	100.0000	0.0000
103.5	0	0	0.0000	100.0000	0.0000
104.5	0	0	0.0000	100.0000	0.0000
105.5	0	0	0.0000	100.0000	0.0000
106.5	0	0	0.0000	100.0000	0.0000

Best Fit Curve Results
TEP
Account: 370.00 - Meters

Curve	Life	Sum of Squared Differences
BAND	**1910 - 2017**	
L0.5	16.0	617.083
L0	16.0	738.634
L1	16.0	790.004
O2	16.0	1,145.431
L1.5	16.0	1,213.294
S-0.5	16.0	1,652.969
S0	16.0	1,870.483
O1	16.0	1,945.855
R0.5	16.0	1,950.776
L2	16.0	1,961.447
S0.5	16.0	2,349.707
R1	16.0	2,611.392
S1	16.0	3,134.001
R1.5	16.0	3,340.245
S1.5	16.0	4,107.887
O3	17.0	4,132.357
R2	16.0	4,496.015
L3	16.0	4,666.830
S2	16.0	5,350.491
R2.5	16.0	5,773.726
R3	16.0	7,427.907
O4	20.0	8,086.061
S3	15.0	8,096.894
L4	15.0	8,893.299
R4	15.0	10,562.422
S4	15.0	11,761.023
L5	15.0	12,682.290
R5	15.0	14,447.656
S5	15.0	15,356.973
S6	14.0	18,264.331
SQ	13.0	23,750.450

Analytical Parameters

OLT Placement Band:	1910 - 2016
OLT Experience Band:	1910 - 2017
Minimum Life Parameter	4
Maximum Life Paramete	60
Life Increment Paramete	1
Max Age (T-Cut):	67.5



Analytical Parameters	
OLT Placement Band:	1910 - 2017
OLT Experience Band:	1910 - 2017
Minimum Life Parameter:	4
Maximum Life Parameter:	60
Life Increment Parameter:	1
Max Age (T-Cut):	67.5

TEP

370.00 - Meters

Calculation of Remaining Life
Based Upon Broad Group/Vintage Group Procedures
Related to Original Cost as of December 31, 2017

Survivor Curve .. IOWA: 20 L0.5

			BG/VG Average			
		Surviving	Service	Remaining	ASL	RL
Year	Age	Investment	Life	Life	Weights	Weights
(1)	(2)	(3)	(4)	(5)	(6)=(3)/(4)	(7)=(6)*(5)
2017	0.5	(2,689)	20.00	19.55	(134)	(2,629)
2016	1.5	2,986,103	20.00	18.74	149,305	2,798,656
2015	2.5	10,329,506	20.00	18.00	516,475	9,296,316
2014	3.5	10,395,156	20.00	17.31	519,758	8,995,387
2013	4.5	3,312,054	20.00	16.66	165,603	2,759,331
2012	5.5	3,965,694	20.00	16.06	198,285	3,185,205
2011	6.5	4,796,134	20.00	15.51	239,807	3,719,269
2010	7.5	3,000,127	20.00	15.00	150,006	2,249,653
2009	8.5	1,483,335	20.00	14.52	74,167	1,077,155
2008	9.5	2,357,294	20.00	14.08	117,865	1,660,020
2007	10.5	1,228,318	20.00	13.67	61,416	839,754
2006	11.5	0	20.00	13.28	0	0
2005	12.5	0	20.00	12.91	0	0
2004	13.5	0	20.00	12.55	0	0
2003	14.5	0	20.00	12.19	0	0
2002	15.5	20,514	20.00	11.85	1,026	12,153
2001	16.5	10,893	20.00	11.51	545	6,272
2000	17.5	5,135	20.00	11.19	257	2,873
1999	18.5	3,800	20.00	10.87	190	2,066
1998	19.5	7,188	20.00	10.57	359	3,797
1997	20.5	1,570	20.00	10.27	79	806
1996	21.5	2,720	20.00	9.97	136	1,357
1995	22.5	14,045	20.00	9.69	702	6,806
1994	23.5	4,949	20.00	9.42	247	2,330
1993	24.5	859	20.00	9.15	43	393
1992	25.5	4,787	20.00	8.89	239	2,127
1991	26.5	(177,798)	20.00	8.63	(8,890)	(76,744)
1990	27.5	3,711	20.00	8.39	186	1,556
1989	28.5	2,684	20.00	8.15	134	1,093
1988	29.5	2,429	20.00	7.91	121	961

1987	30.5	4,313	20.00	7.69	216	1,658
1986	31.5	3,901	20.00	7.47	195	1,456
1985	32.5	1,246	20.00	7.25	62	452
1984	33.5	1,617	20.00	7.05	81	570
1983	34.5	1,527	20.00	6.84	76	523
1982	35.5	2,525	20.00	6.65	126	840
1981	36.5	4,894	20.00	6.46	245	1,581
1980	37.5	4,261	20.00	6.28	213	1,338
1979	38.5	3,886	20.00	6.10	194	1,186
1978	39.5	2,547	20.00	5.93	127	756
1977	40.5	800	20.00	5.77	40	231
1976	41.5	353	20.00	5.61	18	99
1975	42.5	327	20.00	5.46	16	89
1974	43.5	1,319	20.00	5.32	66	351
1973	44.5	1,832	20.00	5.18	92	475
1972	45.5	1,134	20.00	5.05	57	286
1971	46.5	1,368	20.00	4.92	68	337
1970	47.5	1,339	20.00	4.80	67	321
1969	48.5	746	20.00	4.68	37	175
1968	49.5	413	20.00	4.57	21	94
1967	50.5	0	20.00	4.46	0	0
1966	51.5	36	20.00	4.35	2	8
1965	52.5	322	20.00	4.24	16	68
1964	53.5	253	20.00	4.13	13	52
1963	54.5	615	20.00	4.02	31	124
1962	55.5	147	20.00	3.90	7	29
1961	56.5	181	20.00	3.78	9	34
1960	57.5	220	20.00	3.65	11	40
1959	58.5	253	20.00	3.51	13	45
1958	59.5	70	20.00	3.37	3	12
1957	60.5	34	20.00	3.21	2	6
1956	61.5	65	20.00	3.05	3	10
1955	62.5	63	20.00	2.89	3	9
1954	63.5	0	20.00	2.72	0	0
1953	64.5	0	20.00	2.55	0	0
1952	65.5	0	20.00	2.37	0	0
1951	66.5	0	20.00	2.19	0	0
1950	67.5	0	20.00	2.01	0	0
1949	68.5	0	20.00	1.82	0	0
1948	69.5	0	20.00	1.62	0	0
1947	70.5	0	20.00	1.44	0	0
1946	71.5	0	20.00	1.27	0	0
1945	72.5	0	20.00	1.04	0	0
1944	73.5	0	20.00	0.90	0	0
1943	74.5	0	20.00	0.50	0	0
1942	75.5	0	20.00	0.50	0	0
1941	76.5	0	20.00	0.50	0	0

1940	77.5	0	20.00	0.50	0	0
1939	78.5	0	20.00	0.50	0	0
1938	79.5	0	20.00	0.50	0	0
1937	80.5	0	20.00	0.50	0	0
1936	81.5	0	20.00	0.50	0	0
1935	82.5	0	20.00	0.50	0	0
1934	83.5	0	20.00	0.50	0	0
1933	84.5	0	20.00	0.50	0	0
1932	85.5	0	20.00	0.50	0	0
1931	86.5	0	20.00	0.50	0	0
1930	87.5	0	20.00	0.50	0	0
1929	88.5	0	20.00	0.50	0	0
1928	89.5	0	20.00	0.50	0	0
1927	90.5	0	20.00	0.50	0	0
1926	91.5	0	20.00	0.50	0	0
1925	92.5	0	20.00	0.50	0	0
1924	93.5	0	20.00	0.50	0	0
1923	94.5	0	20.00	0.50	0	0
1922	95.5	0	20.00	0.50	0	0
1921	96.5	0	20.00	0.50	0	0
1920	97.5	0	20.00	0.50	0	0
1919	98.5	0	20.00	0.50	0	0
1918	99.5	0	20.00	0.50	0	0
1917	100.5	0	20.00	0.50	0	0
1916	101.5	0	20.00	0.50	0	0
1915	102.5	0	20.00	0.50	0	0
1914	103.5	0	20.00	0.50	0	0
1913	104.5	0	20.00	0.50	0	0
1912	105.5	0	20.00	0.50	0	0
1911	106.5	0	20.00	0.50	0	0
1910	107.5	0	20.00	0.50	0	0
		43,801,125			2,190,056	36,559,212

AVERAGE SERVICE LIFE	20.00
AVERAGE REMAINING LIFE	16.69

EXHIBIT 3

DIRECT TESTIMONY OF MICHAEL MAJOROS

On Behalf of WRA

Docket No. E-01933A-19-0028

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name and summarize your position and qualifications.

A. My name is Michael J. Majoros, Jr. I am president of Snavely King Majoros & Associates, Inc. ("Snavely King Majoros or SKM"). SKM is an economic consulting firm specializing in public utility and telecommunications costs and rates. Appendix A is a brief description of my qualifications and experience. It also contains a listing of my appearances before state and federal regulatory bodies. I am submitting this testimony on behalf of Western Resource Advocates (WRA).

II. PURPOSE AND SUBJECT OF TESTIMONY

Q. What is the purpose and subject of your testimony?

A. Western Resource Advocates (WRA) retained my firm to review the depreciation aspects of Tucson Electric Power Company's requested rate increase. My testimony addresses the Company's request to incorporate into its service rates a $16.5 million[1] depreciation expense increase. I focus on the Company's production plant depreciation changes and my associate James S. Garren addresses the company's transmission, distribution and general plant depreciation proposals. WRA asked us to review TEP's filing and testimony related to asset depreciation and to provide testimony on a proposal for preserving the retirement dates on gas units, adjusting the depreciation schedule of those facilities to and reducing depreciation on other assets in order to minimize rate impacts.

III. WRA

Q. Please describe WRA.

A. WRA is a non-profit conservation organization dedicated to protecting the land, air, and water of the West. WRA's Clean Energy Program develops and implements policies to reduce environmental impacts of the electric power industry in the Interior

[1] Docket No. E-01933A-19-0028 Direct Testimony of Ronald E. White (White Testimony). pages 2 – 3.

West by advocating for a western electric system that provides affordable and reliable energy, reduces economic risks, and protects the environment through the expanded use of energy efficiency, renewable energy resources, and other clean energy technologies.

IV. QUALIFICATIONS

Q. What are your qualifications to present this testimony?

A. I have 40 years' experience in the public utility field. I have testified on numerous utility accounting and ratemaking issues and I have studied and debated the use of the customers' discount rate revenue requirement comparisons in a presentation to the Iowa State Regulatory Conference in 1986. Those comments are relevant in this proceeding. Also, my firm specializes in public utility depreciation. Our clients have ranged from consumer organizations and utility commissions to large companies that purchase regulated utility services. We have appeared as expert witnesses on depreciation before the regulatory commissions of more than half of the states in the country including Arizona. I have testified in well over 100 proceedings on the subject of public utility depreciation. I have also negotiated on behalf of clients in fifteen of the Federal Communications Commission's ("FCC") triennial depreciation represcription conferences.

Q. Do you have any experience in the environmental field?

A. I have some tangential environmental experience. In 2005 I testified on behalf of the U.S. EPA staff in a court case involving a utility's plant modifications and how they related to the Clean Air Act. In 2006, I appeared before the Maryland General Assembly and the Maryland House of Delegates regarding a utility's capability to finance improvements required by the Maryland Healthy Air Act.

V. SUMMARY OF COMPANY'S FILING

Q. Please summarize the Company's filing.

A. TEPs Application indicates that its requesting an overall increase in *non-fuel* retail revenues of $114.9 million partially offset by a $38.9 million decrease to base fuel revenues … resulting in an overall $76.0 million increase to retail revenues which is approximately 7.8% over test year retail revenues.[2] TEP states it is also seeking approval of updated depreciation rates.[3]

Q. Please summarize the source and details of TEPs current depreciation rates.

A. The Commission established the current despeciation rates in a settlement of Docket Nos. E-01933A-15-0239 and E-01933A-15-0322, Order No. 75975. The parties accepted TEP's proposed depreciation rates, "except (i) that the rates for San Juan Generating Station would be adjusted to reflect a depreciable life of TEP's total investment, including the Balanced Draft project, at San Juan Unit 1 of (6) years; (ii) $90 million of excess distribution reserves will be transferred will be transferred to San Juan Unit 1 and(iii) a change in depreciation rates on TEP's distribution plant to offset the change in depreciation expense for San Juan Unit 1."[4]

Q. What are the specifics of TEPs updated depreciation requests?

A. TEP is "proposing new depreciation rates based on an updated depreciation study. The updated depreciation rates would modify the depreciation rates approved by the Commission in Decision No. 75975."[5] The Company provides the pre-filed direct testimonies and exhibits of several witnesses supporting its requests. Dr. Ron White supports the depreciation methodology and rates.[6]

---

[2] Docket No. E-01933A-19-0028 ("Application") page 1.
[3] Id.
[4] Settlement Document, page 4.
[5] Application, page 6.
[6] Id., pages 7- 8.

Q. How does Dr. White describe his presentation?

A. TEP engaged Dr. White's firm to conduct a 2018 depreciation rate study for electric plant subject to the Arizona Corporation Commission's ("ACC") jurisdiction.[7] TEP also asked Dr. White to develop 2019 depreciation rates for Gila River Unit 2.[8] The purpose of his testimony is to sponsor and describe his studies – Exhibit REW – 1.[9] Dr. White based his 2018 rates and accruals on December 31, 2017 plant and accumulated depreciation balances. Dr. White's proposals will increase TEPs 2018 annualized accrual by $16.5 million as follows:

Dr. White's Reported Increase to 2018 Depreciable Plant Annualized Accrual[10]
($millions)

Steam Production	$11.5
Other Production	(3.5)
Transmission	2.2
Distribution	6.1
General	(.2)
Net salvage (Trans.)	.2
Net Salvage (Dist.)	.2
Total	$16.5

Dr. White's composite 2018 accrual rate for TEP electric operations is 2.89 percent compared to the current 2.60 percent.[11]

Q. Does Dr. Whites also propose an increase to depreciation expense for Gila River Unit 2?

A. Yes, Dr. White proposes an additional $3.4 million 2019 annualized accrual for the Gila River Unit 2 which TEP proposes to purchase.

Q. How did Dr. White calculate his proposed production plant depreciation rates?

---

[7] Docket No. E-01933A-19-0028 Direct Testimony of Ronald E. White (White Testimony). pages 2 – 3.
[8] Id., pages 2-3.
[9] Id., page 3.
[10] Id., pages 10-11.
[11] Id., page 11.

A. Dr. White used the "straight-line method, vintage group procedure and remaining-life technique."[12] Dr. White used the life-span procedure combined with the vintage group procedure to calculate weighted average remaining lives to calculate remaining life rates for the production plant units. He used the vintage group procedure to account for interim retirements estimated to occur prior to the ultimate final retirement of each unit.

Q. What are the primary drivers of the functional expense changes summarized above?

A. Dr. White states the primary drivers of the changes above (all functions) "is the retirement years changes described in the Direct Testimony of Michael E. Sheehan on page 7."[13]

Q. Did Dr. White also calculate a 2019 proposal for Gila River Unit 2 in anticipation of the pending purchase?

A. Yes.

Q. What is Dr. White's Gila River Unit 2 proposal?

A. Dr. White proposes a 2063 final retirement year for Gila Unit 2 in lieu of the 2048 final retirement year underlying the Gila Unit 2 PPA. Dr. White's Gila River Unit 2 proposal would Increase the <u>2019</u> annualized accrual (to be included in 2020 expense) by $3.4 million.[14] Since Gila River Unit 2 will be recorded in the Other Production Function it is reasonable to assume that the additional $3.4 million would offset the $3.5 million Other Production reduction for 2018.[15]

Q. What is the implied net depreciation expense change combining the 2018 study and the 2019 Gila River Unit 2 study?

A. The numbers above imply a net increase of about $19.9 million but that amount reflects two different time periods.

---

[12] Id., page 10.
[13] Response to WRA 2.02
[14] White Testimony, Page 11.
[15] Currently, TEP pays for Gila Unit 2 energy through a PPA.

Dr. White's Implied Net Increase to 2018 Annualized Accrual[16]
($millions)

Steam Production	$11.5
Other Production with Gila Unit 2	(.1) [17]
Transmission	2.2
Distribution	6.1
General	(.2)
Net salvage (Trans.)	.2
Net Salvage (Dist.)	.2
Total	$19.9

Q. Does TEP adjust the 2018 net increase to arrive at a 2019 proforma depreciation expense?

A. Yes. Mr. Jason Rademacher is TEP's sponsoring witness for its overall revenue increase and several pro forma adjustments. He transforms the implied $19.9 million net increase into what appears to be a $28.8 million total company increase in the company's 2019 revenue requirement calculation.[18] The final 2019 revenue requirement depreciation expense for depreciable plant appears to be:

TEP's 2019 Proforma Adjustment to 2018 Annualized Accrual[19]
($millions)

	Total Company	ACC Jurisdiction
Steam Production	$(16.4)	$(14.7)
Other Production with Gila Unit 2	5.7	5.1
Transmission	3.0	0.0
Distribution	34.0	34.0
General	3.5	2.8
Net salvage (Trans.)		-
Net Salvage (Dist.)		-
Total	$28.8	$27.2

[16] White Testimony, Page 11.
[17] 2018 $3.5 million Other Production decrease plus Gila River Unit 2 $3.4 million increase. (-$3.5 million + $3.4 million equals - $.1 million.)
[18] Adjusted Test Year Income Statement. See WRA 1.03, UDR 1.001 Proforma Adjustments.
[19] Rademacher Workpapers.

Q. Did you attempt to reconcile the numbers from Dr. White's studies to the company revenue requirement calculations?

A. Yes, WRA 2.07 asked the Company to "Please reconcile all plant and reserve amounts included in Dr. White's study with the equivalent amounts from Mr. Rademacher's [revenue requirement] schedules." The Company responded that "If WRA is referring to rate base schedules showing plant in service and accumulated depreciation, they are not comparable to Dr. White's study. Dr. White's study is based on amounts as of December 31, 2017 while the Company rate base schedules are based on amounts as of 12/31/2018."[20]

Q. Was this helpful?

A. It was somewhat helpful, however we were referring to all amounts, including depreciation rates and accruals, in Dr. White's studies. Based on my review of the Company's revenue requirement workpapers, it appears that the Navajo and Sundt retirements account for the downward swing in the Steam Production function. I do not know what accounts for the upward swings in the Other Production and Distribution functions. Nevertheless, we were able to conduct our studies without further pursuit of TEP's response to WRA DR 2.07 because we focused our analysis solely on Dr. White's studies.

VI. REMAINING TOPICS

Q. What topics will you address in the remainder of your testimony?

A. I am recommending several changes to Dr. White's study. I am recommending retention of any lives that TEP proses to shorten. In addition, I am recommending decelerated sum-of-the-years-digits depreciation for the Gila River units – including Gila River Unit 2. Finally, I am recommending the exclusion of decommissioning costs from

[20] Response to WRA 2.07.

the Company's production plant depreciation rates. I will explain further by addressing the following topics:

- TEP's Proposed Final Retirement Years, Interim Retirements and Remaining-Life Depreciation;
- TEP's Revenue Requirement Levelization Approach;
- Alternative depreciation methods, including a comparison of straight-line, accelerated and decelerated depreciation expense and revenue requirement; and
- TEP's proposed decommissioning costs.

VII. TEP'S PROPOSED FINAL RETIREMENT YEARS, INTERIM RETIREMENTS AND REMAINING-LIFE DEPRECIATION

Q. What is a final retirement year?

A. A final retirement year ("FRY") is the year TEP records "the retirement of a major structure unit [e.g. generating unit] in its entirety, or a very large part of it, as opposed to interim retirements."[21] The period between the study date (in this case December 31, 2017) and the FRY is the remaining life span.[22]

Q. Did Dr. White estimate or compute the FRYs he used in his calculations?

A. No, Dr. White obtained the FRYs from Mr. Sheehan.

Q. What final retirement years does Mr. Sheehan propose?

A. Exhibit___(MJM-1) is drawn from Mr. Sheehan's Text Tables 1 and 5. It shows the Company's FRY estimates sorted by the Steam Production Function Units (Plant account numbers 310 to 316) and its Other Production Function Units (plant account numbers 340 to 346.) It also shows the fuel type by unit and the FRYs underlying the current depreciation rates and Mr. Sheehan's new FRYs.

[21] Public Utility Depreciation Practices August 6, 1996; National Association of Regulatory Utility Commissioners, ("NARUC Manual") page 319.
[22] Id., pages 321 and 323.

Q. Does Exhibit___(MJM-1) show Mr. Sheehan's proposed increases and decreases as well as your recommendations?

A. Yes.

Q. What are your recommendations?

A. I recommend retention of the existing FRY for each unit for which the Company is proposing a longer FRY. These include the following:

UNIT	Current FRY	TEP Proposed FRY	SKM FRY
H.W Sundt Common (Steam)	**2048**	**2065**	**2048**
Gila Unit 3 (Other)	**2048**	**2063**	**2048**
Gila Common (Other)	**2048**	**2063**	**2048**
Gila River Unit 2	**2048**	**2063**	**2048**
Luna (Other)	**2051**	**2066**	**2051**
H.W. Sundt CTs 1 (Other)	**2027**	**2032**	**2027**[23]
H.W. Sundt CTs 2 (Other)	**2027**	**2032**	**2027**

Q. Did Dr. White use Mr. Sheehan's FRY estimates to calculate his proposed production plant depreciation rates?

A. Yes, Dr. White used the FRY estimates in conjunction with the life span approach to calculate average remaining lives ("ARL"). In turn, he used the ARLs to calculate his proposed remaining-life depreciation rates for TEP's production plant units.

Q. Please provide an example?

A. Assume a $1,300 plant unit is scheduled to be retired at the end of 2027. The remaining life span would be 10 years and all other things being equal, Dr. White would

---

[23] Mr. Sheehan's Table 5 indicates the new FRY for Sundt Units 1 and 2 has been reduced from 2028 and 2030 respectively to 2020 for both. This is the result of the Company's plans to replace those Units with 10 18.2 MW natural gas RICE units at Sundt. (Sheehan, page 8-9.) Dr. White excluded Sundt 1 & 2 from his study. Dr. White's study was based on the assumption that the current Sundt CTs FRYs were 2027 for both and were extended to 2032 in his study. SKM has retained the 2027 FRY.

use the 10 years along with the 2017 net plant to calculate straight-line remaining life depreciation rate.

Q. What is net plant?

A. Net plant is gross plant in service minus accumulated depreciation. I have assumed the $1,300 unit was previously depreciated by $300 thus net plant would be $1,000:

Net Plant Example

	Amount$	Percent%
Gross Plant	$1,300	100.00%
Accumulated Depreciation	(300)	(23.08%)
Net Plant	**$1,000**	**76.92%**

Q. How would Dr. White calculate straight-line remaining-life depreciation using your example?

A. He would simply divide the net plant by the 10-year remaining life span as follows:

Straight-Line Remaining Life Depreciation Example

	Amount$	Percent%
Gross Plant	$1,300	100.00%
Accumulated Depreciation	(300)	(23.08%)
Net Plant	**$1,000**	**76.92%**
Remaining Life Span Years	10	10
Annual Straight-Line Remaining Life Depreciation	$10	7.692%

Application of the 7.693 percent rate to the $1,300 gross plant balance would yield $1,000 of accruals over the 10-year remaining life. The $1,000 of new accruals plus the original $300 of accumulated depreciation sum to the $1,300 hence the entire original cost is allocated over the life of the asset.

Q. What are interim retirements?

A. The FRY is the year a majority of the original cost of a major asset such as a plant unit retires. However, the life span procedure also recognizes the probability of "retirements of component parts of a major structure prior to complete removal of the retirement unit from service."[24] These are interim retirements.

Q. What is the impact of interim retirements in life span depreciation rate calculations?

A. Interim retirements have a shorter life than the remaining life span because they are retired before the attainment of the FRY. These are factored into the calculation to shorten the weighted average remaining life to recognize these early piecemeal retirements.

Q. Did Dr. White include interim retirements in his production plant remaining life estimates?

A. Yes, Dr. White used interim retirements to determine weighted average remaining lives for each unit.

Q. Please provide an example demonstrating Dr. White's use of interim retirements to calculate a weighted average remaining life.

A. Dr. White proposes a 2040 FRY for Springerville Unit 1. That results in a 23-year remaining life span as of December 31, 2017. However, Dr. White's interim retirement estimate reduced the 23-year remaining life span to a 21.83 year weighted average remaining life. The shorter remaining life increased the resulting depreciation rate.

Q. What is WRA's position relating to TEP's proposed FRY's?

A. As noted above and as indicated on Exhibit___(MJM-1) WRA objects to TEP's proposals to lengthen any lives. WRA recommends retaining the existing lives for those accounts.

---

[24] NARUC Manual, page 321.

VIII. TEP'S LEVELIZATION APPROACH

Q. Exhibit___(MJM-1) indicates that Mr. Sheehan proposes to shorten FRYs for some plant units and to lengthen the FRY's for some plant units. Can you explain his rationale?

A. Yes, Mr. Sheehan seeks to levelize production plant depreciation expense over a longer period of time. Mr. Sheehan states:

> These depreciation life recommendations will accelerate the cost recovery related to future coal plant retirements while mitigating the rate impacts associated with incorporating more flexible natural gas generation needed to integrate higher levels of renewables. These proposed changes will provide the Company with a mechanism to levelize costs for customers as the Company continues its transition to a cleaner, lower cost and more sustainable resource portfolio.[25]

Mr. Sheehan also explains:

> As part of this rate case, the Company is proposing to shorten the useful lives of the coal and older natural gas steam resources at the Springerville and Sundt Generating Stations. Moreover, the Company is also proposing to extend the lives of its newest, highly efficient natural gas combined cycle units at the Gila River Power Station and the Luna Energy Facility. This 'gradualism' approach enables the Company to levelize its generating portfolio depreciation costs over a longer timeframe."[26]

Q. Please summarize the theory of Mr. Sheehan's levelization approach.

A. Mr. Sheehan has shortened some lives which will increase near term revenue requirements due to higher straight-line depreciation expense and he has offset the increases with an extension of the existing H.W Sundt Common, Gila River Units, Gila River Unit 2 and Luna units.[27] It appears that these extensions could be inconsistent with a

---

[25] Direct Testimony of Michael E. Sheehan (Sheehan"), page 10 – 11.

[26] Response to WRA 2.22

[27] Mr. Sheehan lengthened the lives of the embedded Gila units on the Company's books at 12/31/17. Dr. White used those longer lives to compute 12/31/17 depreciation rates. In addition, Mr. Sheehan lengthened the life of Gila River Unit 2, even though the Company did not own that Unit at 12/31/17. Dr. White used the extended Gila 2 life to calculate 12/31/18 depreciation rates for that unit.

carbon neutral environment in the 2050 range.[28] At the same time, as noted above I am also concerned about the near-term incremental revenue requirement impacts of the shorter lives without the offsetting reductions resulting from longer lives.

IX. ALTERNATIVE DEPRECIATION METHODS

Q. Are there any other ways the Company could reduce the up-front revenue requirement increases?

A. Yes. Mr. Sheehan bases his recommendations upon the continued use of straight-line depreciation. Straight-line depreciation in turn produces a front-loaded revenue requirement because rate base is at its highest level in the early part of an asset's life. TEP could use a decelerated depreciation method to offset the increases resulting from reducing the FRYs. This approach would not require forced extensions of existing and new fossil-fueled production units like the Gila River Units.

Q. Please explain how a decelerated depreciation method could offset depreciation increases resulting from reducing final retirement years.

A. I will discuss straight-line, accelerated and decelerated depreciation to demonstrate my point. Assuming a 10-year life, the straight-line depreciation expense pattern is a straight horizontal line at ten percent for the entire 10-year period. Accelerated and decelerated depreciation calculate depreciation expense using the same 10-year life, but with different patterns. The accelerated method frontloads depreciation starting with high expenses that decline throughout the life. The decelerated pattern is just the reverse - low depreciation expense in the beginning that increases over the life.

Q. Please provide a comparison of an accelerated method and decelerated method.

---

[28] For example, I understand The Intergovernmental Panel on Climate Change's 2018 report outlines several findings (including the need to be carbon neutral by 2050) and also goes over authors/citations/peer review information: https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/.

A. The sum-of-the-years' digits ("SOYD") method can be used to demonstrate both accelerated and decelerated depreciation over the same 10-year life. All three methods (including straight-line) produce the same total depreciation over the 10-year life.

Q. Does Dr. White recognize SOYD as a legitimate element of a depreciation system?

A. Yes.[29]

Q. How is SOYD calculated?

A. SOYD depreciation is calculated by summing the total digits for a particular life. A 10-year life has 55 digits, i.e. the sum of 1 to 10. These digits are then allocated to time periods using an equation in which the denominator is the sum of the digits (55) and the numerator is the year of the rate calculation. The approach results in accelerated if the starting point is the last year of the string. The resulting rate starts high and then increases. The approach is decelerated if the starting point is the first year of the string. The resulting rate starts low and then increases each year. Exhibit___(MJM-2) contains an example of straight-line depreciation of a $1,000 asset over a 10-year life compared to accelerated and decelerated SOYD both numerically and graphically.

Q. Can you calculate remaining-life depreciation rates using the decelerated SOYD method?

A. Yes. The remaining life SOYD depreciation rates are calculated as normal and then further multiplied by the beginning net book ratio. This is demonstrated in Exhibit___(MJM-3).

Q. Have you calculated the SOYD rates for TEPs production plant units?

A. Yes, Exhibit___(MJM-4) calculates the remaining-life SOYD rates for all of TEP's Steam Production Plant units as of December 31, 2017. Exhibit___(MJM-5) calculates the remaining-life SOYD rates for all of TEP's Other Production units as of

---

[29] White Direct Testimony, page 6.

December 31, 2017; and Exhibit___(MJM-6) calculates the remaining-life SOYD rates for Gila River Unit 2 as of December 31, 2018.

Q. Would these SOYD depreciation rates remain constant over the remaining life of each unit?

A. No, the rates would increase each year as shown on the exhibits.

Q. Would SOYD levelize revenue requirements?

A. SOYD would offset the early higher straight-line revenue requirements but it would not levelize revenue requirements. The only method that would do that is the "sinking fund approach." I am not recommending the sinking fund approach.

Q. Would future customers face higher costs in the future using reverse SOYD depreciation rates?

A. Yes, but they would be paying for those costs with cheaper dollars as a result of inflation.

Q. Is SOYD typically used in regulation to set depreciation rates?

A. No, neither accelerated nor decelerated SOYD is typically used in regulation to set depreciation rates, however we face a significant challenge in the need to transition utility assets from fossil-fuel resources to zero-carbon resources in a short period of time, while trying to mitigate the rate impacts on customers. All things equal, shorter lives increase depreciation rates. That challenge demands that we evaluate and, in certain cases adopt nontraditional depreciation approaches such as what I am presenting in this proceeding. I have described SOYD so the Commission can consider it as one possible solution to dealing with accelerated FRYs. It is clear that in the past the Commission has considered other atypical solutions such as shifting reserves between functions. Back in the 1980s and 1990s the telecom industry was transitioning from an electro-mechanical to a digital environment. The FCC allowed the industry's request to adopt as a solution a "dying plant amortization" approach for its electro-mechanical offices. SOYD is another solution and in my opinion is systematic, rational and not arbitrary. It allocates the full cost of a units to expense over the remaining life of the unit and there is no need to use any inflation or interest rates in the calculation.

Q. Are you recommending the remaining-life SOYD rates for all of TEPs Production plant units?

A. I am not recommending the remaining-life SOYD rates for all of TEP's production units. I am recommending the remaining-life SOYD rates only for the Gila River units for which I have shortened Dr. White's 2063 FRY back to the existing 2048 FRY. TEP proposes to lengthen these lives to reduce depreciation relative to increase resulting from other shorter lives. SOYD eliminates the need to lengthen the Gila River lives to reduce depreciation.

Q. Please explain why you are not recommending SOYD for the other units for which TEP is proposing accelerated FRYs?

A. It is not my goal to reduce substantially the Company's current depreciation expense overall by adopting SOYD. On the other hand, I do not see a need for an increase. As I will explain below, I am recommending exclusion of the Company's proposed decommissioning from its depreciation rates. That exclusion has a relatively significant effect, so if accepted it is not necessary to use SOYD for all of the units for which TEP proposes accelerated FRYs.

X. TEP'S PROPOSED DECOMMISSIONING COSTS

Q. Has Dr. White incorporated negative net salvage in his production plant depreciation rates?

A. Yes, Dr. White included negative net salvage ratios in his proposed depreciation rates.

Q. What is negative net salvage?

A. Negative net salvage is a charge to ratepayers that assumes TEP will spend more money than it will take in when it retires plant assets from service. Negative net salvage increases depreciation rates.

Q. How did Dr. White estimate the amount of negative net salvage to include in the production plant depreciation rates?

A. Dr. White estimated the amount of negative net salvage relating to interim retirements. Next, he estimated the amount of future negative net salvage the Company would incur when the units are ultimately retired in their FRYs. These are decommissioning costs. He added his interim net salvage estimate to his decommissioning estimate and converted them into ratios used in his production plant depreciation rates.

Q. How did Dr. White estimate these future decommissioning costs?

A. Dr. White obtained decommissioning cost studies the Company had prepared by external engineers. These costs were stated in 2018 dollars which Dr. White escalated to the FRYs at a 2.00 percent inflation rate.

Q. Do you object to including these decommissioning costs in depreciation rates?

A. I object to including these decommissioning costs in depreciation rates because TEP does not have any legal obligations to retire these units at any given date or to incur these decommissioning costs when the units are retired.[30] TEP only has legal obligations relating to restoring land to its original condition, landfill and pond closures and the related closure care, mine reclamation, and asbestos abatement.[31] Unfortunately, Dr. White removed the costs of these actual obligations from the depreciation study and replaced them with the escalated decommissioning costs.[32]

[30] Response to WRA 2.20 b.
[31] Response to WRA 2.20 c.
[32] Response to WRA 2.18

Q. What do you recommend?

A. I recommend disallowance of the escalated decommissioning costs from depreciation rates. Exhibit___(MJM-7) calculates production plant net salvage ratios relating only to the estimated interim retirements. I recommend inclusion of these in the production plant depreciation rates.

XI. SUMMARY

Q. Have you prepared tables comparing your recommendations to Dr. White's 2018 proposals and his 2019 proposals for Gila River Unit 2?

A. Yes, Exhibit___(MJM-8) contains a comparison of the 2018 proposals to my proposals reflecting my retention of existing lives as discussed above, my decommission cost adjustment and the use of SOYD for the 2017 Gila River Units. Exhibit___(MJM-9) contains a comparison of the 2018 proposals to my proposals reflecting my retention of existing lives as discussed above, my decommission cost adjustment but without the use of SOYD for the 2017 Gila River Units. Exhibit___(MJM-10) contains the 2019 proposals for Gila River Unit 2.

The following Table summarizes the results.

Summary Results of SKM Lives, Net Salvage, and SOYD Adjustments Exhibit___(MJM-8) and (MJM-10)
($millions)

Description	2018 Steam Production	2018 Other Production	2019 Gila Unit 2
TEP Proposal	$81.5	$12.8	$3.4
SKM Proposal	$69.5	$9.8	$ .3
SKM Reduction	$(12.0)	$(3.0)	$(3.1)

In summary, the Company has proposed a $16.5 million annualized depreciation expense increase overall for 2018. In addition, he proposes $3.4 million of 2019 depreciation expense for Gila River Unit 2. My production plant recommendations retain existing lives for any unit for which the Company has reflected a longer life in its depreciation study. I have excluded decommissioning costs from the Company's proposal and I have used the SOYD depreciation procedure for the Company's existing Gila River units and its planned Gila River Unit 2. My production plant recommendations reduce the Company's depreciation increase by $18.1 million. Mr. Garren's recommendations in the distribution and general plant functions further reduce the Company's overall increase by another $3.1 million. Thus SKM proposes a $21.2 decrease relative to the $19.9 million increase in Dr. Whites filed study, for a net decrease of approximately $1.3 million to the revenue requirement.

Q. Does this conclude your testimony?

A. Yes, it does.

Experience

Analytica94, Inc.
Chairman and Founder (2013 to present)

A94 is a chartable non-profit organization founded in 2013 to provide independent research, economic models, and training to evaluate the effectiveness of economic regulation of U.S. industries.

Snavely King Majoros & Associates, Inc.
President (2010 to present)
Vice President and Treasurer (1988 to 2010)
Senior Consultant (1981-1987)

Mr. Majoros provides consultation specializing in accounting, financial, and management issues. He has testified as an expert witness or negotiated on behalf` of clients in more than one hundred thirty regulatory federal and state regulatory proceedings involving telephone, electric, gas, water, and sewerage companies. His testimony has encompassed a wide array of complex issues including taxation, divestiture accounting, revenue requirements, rate base, nuclear decommissioning, plant lives, and capital recovery. Mr. Majoros has also provided consultation to the U.S. Department of Justice and appeared before the U.S. EPA and the Maryland State Legislature on matters regarding the accounting and plant life effects of electric plant modifications and the financial capacity of public utilities to finance environmental controls. He has estimated economic damages suffered by black farmers in discrimination suits.

Van Scoyoc & Wiskup, Inc., *Consultant (1978-1981)*

Mr. Majoros conducted and assisted in various management and regulatory consulting projects in the public utility field, including preparation of electric system load projections for a group of municipally and cooperatively owned electric systems; preparation of a system of accounts and reporting of gas and oil pipelines to be used by a state regulatory commission; accounting system analysis and design for rate proceedings involving electric, gas, and telephone utilities. Mr. Majoros provided onsite management accounting and controllership assistance to a municipal electric and water utility. Mr. Majoros also assisted in an antitrust proceeding involving a major electric utility. He submitted expert testimony in FERC Docket No. RP79-12 (El Paso Natural Gas Company), and he co-authored a study entitled Analysis of Staff Study on Comprehensive Tax Normalization that was submitted to FERC in Docket No. RM 80-42.

Handling Equipment Sales Company, Inc.
Controller/Treasurer (1976-1978)

Mr. Majoros' responsibilities included financial management, general accounting and reporting, and income taxes.

Ernst & Ernst, *Auditor (1973-1976)*

Mr. Majoros was a member of the audit staff where his responsibilities included auditing, supervision, business systems analysis, report preparation, and corporate income taxes.

University of Baltimore - *(1971-1973)*

Mr. Majoros was a full-time student in the School of Business.

During this period Mr. Majoros worked consistently on a part-time basis in the following positions: Assistant Legislative Auditor – State of Maryland, Staff Accountant – Robert M. Carney & Co., CPA's, Staff Accountant – Naron & Wegad, CPA's, Credit Clerk – Montgomery Wards.

Central Savings Bank, *(1969-1971)*

Mr. Majoros was an Assistant Branch Manager at the time he left the bank to attend college as a full-time student. During his tenure at the bank, Mr. Majoros gained experience in each department of the bank. In addition, he attended night school at the University of Baltimore.

Education
University of Baltimore, School of Business, B.S. –
Concentration in Accounting

Professional Affiliations
American Institute of Certified Public Accountants
Maryland Association of C.P.A.s
Society of Depreciation Professionals

Publications, Papers, and Panels

"Analysis of Staff Study on Comprehensive Tax Normalization," FERC Docket No. RM 80-42, 1980.

"Telephone Company Deferred Taxes and Investment Tax Credits – A Capital Loss for Ratepayers," Public Utility Fortnightly, September 27, 1984.

"The Use of Customer Discount Rates in Revenue Requirement Comparisons," Proceedings of the 25th Annual Iowa State Regulatory Conference, 1986

"The Regulatory Dilemma Created By Emerging Revenue Streams of Independent Telephone Companies," Proceedings of NARUC 101st Annual Convention and Regulatory Symposium, 1989.

"BOC Depreciation Issues in the States," National Association of State Utility Consumer Advocates, 1990 Mid-Year Meeting, 1990.

"Current Issues in Capital Recovery" 30th Annual Iowa State Regulatory Conference, 1991.

"Impaired Assets Under SFAS No. 121," National Association of State Utility Consumer Advocates, 1996 Mid-Year Meeting, 1996.

"What's 'Sunk' Ain't Stranded: Why Excessive Utility Depreciation is Avoidable," with James Campbell, Public Utilities Fortnightly, April 1, 1999.

"Local Exchange Carrier Depreciation Reserve Percents," with Richard B. Lee, Journal of the Society of Depreciation Professionals, Volume 10, Number 1, 2000-2001

"Rolling Over Ratepayers," Public Utilities Fortnightly, Volume 143, Number 11, November, 2005.

"Asset Management – What is it ?" American Water Works Association, Pre-Conference Workshop, March 25, 2008.

"Main Street Gold Mine," with Dr. K. Pavlovic and J. Legieza, Public Utilities Fortnightly, October, 2010

Michael J. Majoros, Jr.

Date	Jurisdiction / Agency	Docket	Utility

Federal Courts

2005	US District Court, Northern District of AL, Northwestern Division 55/56/57/	CV 01-B-403-NW	Tennessee Valley Authority

State Legislatures

2006	Maryland General Assembly 61/	SB154	Maryland Healthy Air Act
2006	Maryland House of Delegates 62/	HB189	Maryland Healthy Air Act

Federal Regulatory Agencies

1979	FERC-US 19/	RP79-12	El Paso Natural Gas Co.
1980	FERC-US 19/	RM80-42	Generic Tax Normalization
1996	CRTC-Canada 30/	97-9	All Canadian Telecoms
1997	CRTC-Canada 31/	97-11	All Canadian Telecoms
1999	FCC 32/	98-137 (Ex Parte)	All LECs
1999	FCC 32/	98-91 (Ex Parte)	All LECs
1999	FCC 32/	98-177 (Ex Parte)	All LECs
1999	FCC 32/	98-45 (Ex Parte)	All LECs
2000	EPA 35/	CAA-00-6	Tennessee Valley Authority
2003	FERC 48/	RM02-7	All Utilities
2003	FCC 52/	03-173	All LECs
2003	FERC 53/	ER03-409-000, ER03-666-000	Pacific Gas and Electric Co.
2017	FERC 53/	ER16-2320-002	Pacific Gas and Electric Company

State Regulatory Agencies

1982	Massachusetts 17/	DPU 557/558	Western Mass Elec. Co.
1982	Illinois 16/	ICC81-8115	Illinois Bell Telephone Co.
1983	Maryland 8/	7574-Direct	Baltimore Gas & Electric Co.
1983	Maryland 8/	7574-Surrebuttal	Baltimore Gas & Electric Co.
1983	Connecticut 15/	810911	Woodlake Water Co.
1983	New Jersey 1/	815-458	New Jersey Bell Tel. Co.
1983	New Jersey 14/	8011-827	Atlantic City Sewerage Co.
1984	Dist. Of Columbia 7/	785	Potomac Electric Power Co.
1984	Maryland 8/	7689	Washington Gas Light Co.
1984	Dist. Of Columbia 7/	798	C&P Tel. Co.
1984	Pennsylvania 13/	R-832316	Bell Telephone Co. of PA
1984	New Mexico 12/	1032	Mt. States Tel. & Telegraph

1984	Idaho 18/	U-1000-70	Mt. States Tel. & Telegraph
1984	Colorado 11/	1655	Mt. States Tel. & Telegraph
1984	Dist. Of Columbia 7/	813	Potomac Electric Power Co.
1984	Pennsylvania 3/	R842621-R842625	Western Pa. Water Co.
1985	Maryland 8/	7743	Potomac Edison Co.
1985	New Jersey 1/	848-856	New Jersey Bell Tel. Co.
1985	Maryland 8/	7851	C&P Tel. Co.
1985	California 10/	I-85-03-78	Pacific Bell Telephone Co.
1985	Pennsylvania 3/	R-850174	Phila. Suburban Water Co.
1985	Pennsylvania 3/	R850178	Pennsylvania Gas & Water Co.
1985	Pennsylvania 3/	R-850299	General Tel. Co. of PA
1986	Maryland 8/	7899	Delmarva Power & Light Co.
1986	Maryland 8/	7754	Chesapeake Utilities Corp.
1986	Pennsylvania 3/	R-850268	York Water Co.
1986	Maryland 8/	7953	Southern Md. Electric Corp.
1986	Idaho 9/	U-1002-59	General Tel. Of the Northwest
1986	Maryland 8/	7973	Baltimore Gas & Electric Co.
1987	Pennsylvania 3/	R-860350	Dauphin Cons. Water Supply
1987	Pennsylvania 3/	C-860923	Bell Telephone Co. of PA
1987	Iowa 6/	DPU-86-2	Northwestern Bell Tel. Co.
1987	Dist. Of Columbia 7/	842	Washington Gas Light Co.
1988	Florida 4/	880069-TL	Southern Bell Telephone
1988	Iowa 6/	RPU-87-3	Iowa Public Service Company
1988	Iowa 6/	RPU-87-6	Northwestern Bell Tel. Co.
1988	Dist. Of Columbia 7/	869	Potomac Electric Power Co.
1989	Iowa 6/	RPU-88-6	Northwestern Bell Tel. Co.
1990	New Jersey 1/	1487-88	Morris City Transfer Station
1990	New Jersey 5/	WR 88-80967	Toms River Water Company
1990	Florida 4/	890256-TL	Southern Bell Company
1990	New Jersey 1/	ER89110912J	Jersey Central Power & Light
1990	New Jersey 1/	WR90050497J	Elizabethtown Water Co.
1991	Pennsylvania 3/	P900465	United Tel. Co. of Pa.
1991	West Virginia 2/	90-564-T-D	C&P Telephone Co.
1991	New Jersey 1/	90080792J	Hackensack Water Co.
1991	New Jersey 1/	WR90080884J	Middlesex Water Co.
1991	Pennsylvania 3/	R-911892	Phil. Suburban Water Co.
1991	Kansas 20/	176, 716-U	Kansas Power & Light Co.
1991	Indiana 29/	39017	Indiana Bell Telephone
1991	Nevada 21/	91-5054	Central Tele. Co. – Nevada
1992	New Jersey 1/	EE91081428	Public Service Electric & Gas
1992	Maryland 8/	8462	C&P Telephone Co.
1992	West Virginia 2/	91-1037-E-D	Appalachian Power Co.
1993	Maryland 8/	8464	Potomac Electric Power Co.

1993	South Carolina 22/	92-227-C	Southern Bell Telephone
1993	Maryland 8/	8485	Baltimore Gas & Electric Co.
1993	Georgia 23/	4451-U	Atlanta Gas Light Co.
1993	New Jersey 1/	GR93040114	New Jersey Natural Gas. Co.
1994	Iowa 6/	RPU-93-9	U.S. West – Iowa
1994	Iowa 6/	RPU-94-3	Midwest Gas
1995	Delaware 24/	94-149	Wilm. Suburban Water Corp.
1995	Connecticut 25/	94-10-03	So. New England Telephone
1995	Connecticut 25/	95-03-01	So. New England Telephone
1995	Pennsylvania 3/	R-00953300	Citizens Utilities Company
1995	Georgia 23/	5503-0	Southern Bell
1996	Maryland 8/	8715	Bell Atlantic
1996	Arizona 26/	E-1032-95-417	Citizens Utilities Company
1996	New Hampshire 27/	DE 96-252	New England Telephone
1997	Iowa 6/	DPU-96-1	U S West – Iowa
1997	Ohio 28/	96-922-TP-UNC	Ameritech – Ohio
1997	Michigan 28/	U-11280	Ameritech – Michigan
1997	Michigan 28/	U-112 81	GTE North
1997	Wyoming 27/	7000-ztr-96-323	US West – Wyoming
1997	Iowa 6/	RPU-96-9	US West – Iowa
1997	Illinois 28/	96-0486-0569	Ameritech – Illinois
1997	Indiana 28/	40611	Ameritech – Indiana
1997	Indiana 27/	40734	GTE North
1997	Utah 27/	97-049-08	US West – Utah
1997	Georgia 28/	7061-U	BellSouth – Georgia
1997	Connecticut 25/	96-04-07	So. New England Telephone
1998	Florida 28/	960833-TP et. al.	BellSouth – Florida
1998	Illinois 27/	97-0355	GTE North/South
1998	Michigan 33/	U-11726	Detroit Edison
1999	Maryland 8/	8794	Baltimore Gas & Electric Co.
1999	Maryland 8/	8795	Delmarva Power & Light Co.
1999	Maryland 8/	8797	Potomac Edison Company
1999	West Virginia 2/	98-0452-E-GI	Electric Restructuring
1999	Delaware 24/	98-98	United Water Company
1999	Pennsylvania 3/	R-00994638	Pennsylvania American Water
1999	West Virginia 2/	98-0985-W-D	West Virginia American Water
1999	Michigan 33/	U-11495	Detroit Edison
2000	Delaware 24/	99-466	Tidewater Utilities
2000	New Mexico 34/	3008	US WEST Communications, Inc.
2000	Florida 28/	990649-TP	BellSouth -Florida
2000	New Jersey 1/	WR30174	Consumer New Jersey Water
2000	Pennsylvania 3/	R-00994868	Philadelphia Suburban Water
2000	Pennsylvania 3/	R-0005212	Pennsylvania American Sewerage

2000	Connecticut 25/	00-07-17	Southern New England Telephone
2001	Kentucky 36/	2000-373	Jackson Energy Cooperative
2001	Kansas 38/39/40/	01-WSRE-436-RTS	Western Resources
2001	South Carolina 22/	2001-93-E	Carolina Power & Light Co.
2001	North Dakota 37/	PU-400-00-521	Northern States Power/Xcel Energy
2001	Indiana 29/41/	41746	Northern Indiana Power Company
2001	New Jersey 1/	GR01050328	Public Service Electric and Gas
2001	Pennsylvania 3/	R-00016236	York Water Company
2001	Pennsylvania 3/	R-00016339	Pennsylvania America Water
2001	Pennsylvania 3/	R-00016356	Wellsboro Electric Coop.
2001	Florida 4/	010949-EL	Gulf Power Company
2001	Hawaii 42/	00-309	The Gas Company
2002	Pennsylvania 3/	R-00016750	Philadelphia Suburban
2002	Nevada 43/	01-10001 &10002	Nevada Power Company
2002	Kentucky 36/	2001-244	Fleming Mason Electric Coop.
2002	Nevada 43/	01-11031	Sierra Pacific Power Company
2002	Georgia 27/	14361-U	BellSouth-Georgia
2002	Alaska 44/	U-01-34,82-87,66	Alaska Communications Systems
2002	Wisconsin 45/	2055-TR-102	CenturyTel
2002	Wisconsin 45/	5846-TR-102	TelUSA
2002	Vermont 46/	6596	Citizen's Energy Services
2002	North Dakota 37/	PU-399-02-183	Montana Dakota Utilities
2002	Kansas 40/	02-MDWG-922-RTS	Midwest Energy
2002	Kentucky 36/	2002-00145	Columbia Gas
2002	Oklahoma 47/	200200166	Reliant Energy ARKLA
2002	New Jersey 1/	GR02040245	Elizabethtown Gas Company
2003	New Jersey 1/	ER02050303	Public Service Electric and Gas Co.
2003	Hawaii 42/	01-0255	Young Brothers Tug & Barge
2003	New Jersey 1/	ER02080506	Jersey Central Power & Light
2003	New Jersey 1/	ER02100724	Rockland Electric Co.
2003	Pennsylvania 3/	R-00027975	The York Water Co.
2003	Pennsylvania 3/	R-00038304	Pennsylvania-American Water Co.
2003	Kansas 20/ 40/	03-KGSG-602-RTS	Kansas Gas Service
2003	Nova Scotia, CN 49/	EMO NSPI	Nova Scotia Power, Inc.
2003	Kentucky 36/	2003-00252	Union Light Heat & Power
2003	Alaska 44/	U-96-89	ACS Communications, Inc.
2003	Indiana 29/	42359	PSI Energy, Inc.
2003	Kansas 20/ 40/	03-ATMG-1036-RTS	Atmos Energy
2003	Florida 50/	030001-E1	Tampa Electric Company
2003	Maryland 51/	8960	Washington Gas Light
2003	Hawaii 42/	02-0391	Hawaiian Electric Company
2003	Illinois 28/	02-0864	SBC Illinois
2003	Indiana 28/	42393	SBC Indiana

2004	New Jersey 1/	ER03020110	Atlantic City Electric Co.
2004	Arizona 26/	E-01345A-03-0437	Arizona Public Service Company
2004	Michigan 27/	U-13531	SBC Michigan
2004	New Jersey 1/	GR03080683	South Jersey Gas Company
2004	Kentucky 36/	2003-00434,00433	Kentucky Utilities, Louisville Gas & Electric
2004	Florida 50/ 54/	031033-EI	Tampa Electric Company
2004	Kentucky 36/	2004-00067	Delta Natural Gas Company
2004	Georgia 23/	18300, 15392, 15393	Georgia Power Company
2004	Vermont 46/	6946, 6988	Central Vermont Public Service Corporation
2004	Delaware 24/	04-288	Delaware Electric Cooperative
2004	Missouri 58/	ER-2004-0570	Empire District Electric Company
2005	Florida 50/	041272-EI	Progress Energy Florida, Inc.
2005	Florida 50/	041291-EI	Florida Power & Light Company
2005	California 59/	A.04-12-014	Southern California Edison Co.
2005	Kentucky 36/	2005-00042	Union Light Heat & Power
2005	Florida 50/	050045 & 050188-EI	Florida Power & Light Co.
2005	Kansas 38/ 40/	05-WSEE-981-RTS	Westar Energy, Inc.
2006	Delaware 24/	05-304	Delmarva Power & Light Company
2006	California 59/	A.05-12-002	Pacific Gas & Electric Co.
2006	New Jersey 1/	GR05100845	Public Service Electric and Gas Co.
2006	Colorado 60/	06S-234EG	Public Service Co. of Colorado
2006	Kentucky 36/	2006-00172	Union Light, Heat & Power
2006	Kansas 40/	06-KGSG-1209-RTS	Kansas Gas Service
2006	West Virginia 2/	06-0960-E-42T, 06-1426-E-D	Allegheny Power
2006	West Virginia 2/	05-1120-G-30C, 06-0441-G-PC, et al.	Hope Gas, Inc. and Equitable Resources, Inc.
2007	Delaware 24/	06-284	Delmarva Power & Light Company
2007	Kentucky 36/	2006-00464	Atmos Energy Corporation
2007	Colorado 60/	06S-656G	Public Service Co. of Colorado
2007	California 59/	A.06-12-009, A.06-12-010	San Diego Gas & Electric Co., and Southern California Gas Co.
2007	Kentucky 36/	2007-00143	Kentucky-American Water Co.
2007	Kentucky 36/	2007-00089	Delta Natural Gas Co.
2007	Maine 71/	2007-00215	Central Maine Power
2008	Kansas 40/	08-ATMG-280-RTS	Atmos Energy Corporation
2008	New Jersey 1/	GR07110889	New Jersey Natural Gas Co.
2008	North Dakota 37/	PU-07-776	Northern States Power/Xcel Energy
2008	Pennsylvania 3/	A-2008-2034045 et al	UGI Utilities, Inc. / PPL Gas Utilities Corp.
2008	Washington 63/	UE-072300, UG-072301	Puget Sound Energy

2008	Pennsylvania 3/	R-2008-2032689	Pennsylvania-American Water Co. - Coatesville
2008	New Jersey 1/	WR08010020	NJ American Water Co.
2008	Washington 63/ 64/	UE-080416, UG-080417	Avista Corporation
2008	Texas 65/	473-08-3681, 35717	Oncor Electric Delivery Co.
2008	Tennessee 66/	08-00039	Tennessee-American Water Co.
2008	Kansas	08-WSEE-1041-RTS	Westar Energy, Inc.
2009	Kentucky 36/	2008-00409	East Kentucky Power Coop.
2009	Indiana 29/	43501	Duke Energy Indiana
2009	Indiana 29/	43526	Northern Indiana Public Service Co.
2009	Michigan 33/	U-15611	Consumers Energy Company
2009	Kentucky 36/	2009-00141	Columbia Gas of Kentucky
2009	New Jersey 1/	GR00903015	Elizabethtown Gas Company
2009	District of Columbia 7/	FC 1076	Potomac Electric Power
2009	New Jersey 1/	GR09050422	Public Service Gas & Electric Co.
2009	Kentucky 36/	2009-00202	Duke Energy Kentucky Co.
2010	Kentucky 36/	2009-00549	Louisville Gas and Electric Co.
2010	Kentucky 36/	2009-00548	Kentucky Utilities Co.
2010	New Jersey 1/	GR10010035	Southern New Jersey Gas Co.
2010	Hawaii 42/	2009-0286	Maui Electric Co.
2010	Hawaii 42/	2009-0321	Hawaii Electric Light Co.
2010	Hawaii 42/	2010-0053	Hawaiian Electric Co.
2010	Lancaster 3/	R-2010-2179103	Lancaster Water Fund
2011	Kansas 40/	11-KCPE-581-PRE	Kansas City Power and Light Co.
2011	Delaware 24/	11-207	Artesian
2012	Kentucky 36/	2012-00221	Kentucky Utilities Company
2012	Kentucky 36/	2012-00222	Louisville Gas and Electric Company
2012	Massachusetts 67/	DPU 12-25	Bay State Gas Company
2012	District of Columbia 7/	FC 1093	Washington Gas Light Company
2012	New Jersey 1/	WR11070460	New Jersey American Water
2012	New Jersey 1/	ER11080469	Atlantic City Electric Company
2013	Michigan 33/	U-16769	Michigan Consolidated Gas
2013	New Jersey 1/	ER12111052	Jersey Central Power & Light
2013	Alberta 68/	2322	ATCO Pipelines
2013	North Dakota 37/	PU-12-813	Northern States Power
2013	Massachusetts 67/	D.P.U 13-07	New England Gas Company
2013	Wyoming 69/	20000-427-EA-13	Rocky Mountain Power
2013	New York 70/	13-E-0030	Consolidated Edison
2013	Maine 71/	2013-00168	Central Maine Power
2014	Alberta 68/	2739	Enmax Power Company

2014	West Virginia 2/	14-0701-E-D	Monongahela Power Company
2014	West Virginia 2/	14-1151-E-D	APCO
2015	Maryland 8/	9319	Potomac Edison
2015	Maryland 8/	9385	PEPCO
2015	West Virginia 2/	15-0674-WS-D	WV American Water Company
2016	Pennsylvania 3/	R2016-2529660	Columbia Gas of Pa.
2017	Hawaii 42/	2016-0431	Hawaiian Electric

PARTICIPATION AS NEGOTIATOR IN FCC TELEPHONE DEPRECIATION RATE REPRESCRIPTION CONFERENCES

COMPANY	YEARS	CLIENT
Diamond State Telephone Co. 24/	1985 + 1988	Delaware Public Service Comm
Bell Telephone of Pennsylvania 3/	1986 + 1989	PA Consumer Advocate
Chesapeake & Potomac Telephone Co. - Md. 8/	1986	Maryland People's Counsel
Southwestern Bell Telephone – Kansas 20/	1986	Kansas Corp. Commission
Southern Bell – Florida 4/	1986	Florida Consumer Advocate
Chesapeake & Potomac Telephone Co.-W.Va. 2/	1987 + 1990	West VA Consumer Advocate
New Jersey Bell Telephone Co. 1/	1985 + 1988	New Jersey Rate Counsel
Southern Bell - South Carolina 22/	1986 + 1989 + 1992	S. Carolina Consumer Advocate
GTE-North – Pennsylvania 3/	1989	PA Consumer Advocate

PARTICIPATION IN PROCEEDINGS WHICH WERE SETTLED BEFORE TESTIMONY WAS SUBMITTED

STATE	DOCKET NO.	UTILITY
Maryland 8/	7878	Potomac Edison
Nevada 21/	88-728	Southwest Gas
New Jersey 1/	WR90090950J	New Jersey American Water
New Jersey 1/	WR900050497J	Elizabethtown Water
New Jersey 1/	WR91091483	Garden State Water
West Virginia 2/	91-1037-E	Appalachian Power Co.
Nevada 21/	92-7002	Central Telephone - Nevada
Pennsylvania 3/	R-00932873	Blue Mountain Water
West Virginia2/	93-1165-E-D	Potomac Edison
West Virginia2/	94-0013-E-D	Monongahela Power
New Jersey 1/	WR94030059	New Jersey American Water
New Jersey 1/	WR95080346	Elizabethtown Water
New Jersey 1/	WR95050219	Toms River Water Co.
Maryland 8/	8796	Potomac Electric Power Co.
South Carolina 22/	1999-077-E	Carolina Power & Light Co.
South Carolina 22/	1999-072-E	Carolina Power & Light Co.
Kentucky 36/	2001-104 & 141	Kentucky Utilities, Louisville Gas and Electric
Kentucky 36/	2002-485	Jackson Purchase Energy Corporation
Kentucky 36/	2009-00202	Duke Energy Kentucky
New Jersey 1/	ER09080664	Atlantic City Electric Co.
New Jersey 1/	ER09080668	Rockland Electric Co.

Clients

1/ New Jersey Rate Counsel/Advocate	36/ Kentucky Attorney General
2/ West Virginia Consumer Advocate	37/ North Dakota Public Service Commission
3/ Pennsylvania OCA	38/ Kansas Industrial Group
4/ Florida Office of Public Advocate	39/ City of Witchita
5/ Toms River Fire Commissioner's	40/ Kansas Citizens' Utility Rate Board
6/ Iowa Office of Consumer Advocate	41/ NIPSCO Industrial Group
7/ D.C. People's Counsel	42/ Hawaii Division of Consumer Advocacy
8/ Maryland's People's Counsel	43/ Nevada Bureau of Consumer Protection
9/ Idaho Public Service Commission	44/ GCI
10/ Western Burglar and Fire Alarm	45/ Wisc. Citizens' Utility Rate Board
11/ U.S. Dept. of Defense	46/ Vermont Department of Public Service
12/ N.M. State Corporation Comm.	47/ Oklahoma Corporation Commission
13/ City of Philadelphia	48/ National Assn. of State Utility Consumer Advocates
14/ Resorts International	49/ Nova Scotia Utility and Review Board
15/ Woodlake Condominium Association	50/ Florida Office of Public Counsel
16/ Illinois Attorney General	51/ Maryland Public Service Commission
17/ Mass Coalition of Municipalities	52/ MCI
18/ U.S. Department of Energy	53/ Transmission Agency of Northern California
19/ Arizona Electric Power Corp.	54/ Florida Industrial Power Users Group
20/ Kansas Corporation Commission	55/ Sierra Club
21/ Public Service Comm. – Nevada	56/ Our Children's Earth Foundation
22/ SC Dept. of Consumer Affairs	57/ National Parks Conservation Association, Inc.
23/ Georgia Public Service Comm.	58/ Missouri Office of the Public Counsel
24/ Delaware Public Service Comm.	59/ The Utility Reform Network
25/ Conn. Ofc. Of Consumer Counsel	60/ Colorado Office of Consumer Counsel
26/ Arizona Corp. Commission	61/ MD State Senator Paul G. Pinsky
27/ AT&T	62/ MD Speaker of the House Michael Busch
28/ AT&T/MCI	63/ Washington Office of Public Counsel
29/ IN Office of Utility Consumer Counselor	64/ Industrial Customers of Northwestern Utilities
30/ Unitel (AT&T – Canada)	65/ Steering Committee of Cities
31/ Public Interest Advocacy Centre	66/ City of Chattanooga
32/ U.S. General Services Administration	67/ Massachusetts Attorney General
33/ Michigan Attorney General	68/ Alberta Office of the Utilities Consumer Advocate
34/ New Mexico Attorney General	69/ Wyoming Industrial Energy Consumers
35/ Environmental Protection Agency Enforcement Staff	70/ New York State Department
	71/ Maine Office of Public Advocate

Tucson Electric Power Company **Exhibit___(MJM-2)**

Snavely King Majoros & Associates, Inc.

Straight-Line vs. Accelerated and Decelerated Sum of the Years Digits Depreciation

10-Year Life Example				
Year	**Digits**	**Accelerated SOYD Rate**	**Decelerated SOYD**	**Straight Line**
(1)	(2)	(3)-(2)/55	(4)=(1)/55	(5)=1/10
1	10	18.18%	1.82%	10.00%
2	9	16.36%	3.64%	10.00%
3	8	14.55%	5.45%	10.00%
4	7	12.73%	7.27%	10.00%
5	6	10.91%	9.09%	10.00%
6	5	9.09%	10.91%	10.00%
7	4	7.27%	12.73%	10.00%
8	3	5.45%	14.55%	10.00%
9	2	3.64%	16.36%	10.00%
10	1	1.82%	18.18%	10.00%
	55	100.00%	100.00%	100.00%

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
Example of Remaining Life SOYD Depreciation Rates

Exhibit___(MJM-3)

Line	Description	Example: Net Plant & Parameters			Ratios
1	**Beginning of Year Plant**	$ 1,300			100.00%
2	**Beginning of Year Accum Dep**	$ 300			23.08%
3	**Net Plant**	$ 1,000			76.92%
4	**Remaining Life (nearest whole digit)**	10			
5	**Sum of Years Digits Total**	55			
6					
7	Year	SOYD Whole Life Rate	Net Plant Ratio	SOYD Remaining Life Rate	SOYD RL Expense
8	(1)	(2)=(1)/55	(3)=76.92%	(4)=(2)*(3)	(5)=(4)*1,300
9	1	1.818%	76.92%	1.399%	18
10	2	3.636%	76.92%	2.797%	36
11	3	5.455%	76.92%	4.196%	55
12	4	7.273%	76.92%	5.594%	73
13	5	9.091%	76.92%	6.993%	91
14	6	10.909%	76.92%	8.392%	109
15	7	12.727%	76.92%	9.790%	127
16	8	14.545%	76.92%	11.189%	145
17	9	16.364%	76.92%	12.587%	164
18	10	18.182%	76.92%	13.986%	182
19					
20	Sum of Expense Accruals				$ 1,000
21	Beginning Net Plant				$ 1,000
22	Difference				$ -

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Steam Production Units

Unit		Four Corners Unit 4		Four Corners Unit 5		San Juan Station Unit 1	
Start Year		2018		2018		2018	
Beginning of Year Plant		$ 81,607,613	100.00%	$ 78,783,331	100.00%	$ 270,826,423	100.00%
Beginning of Year Accum Dep		$ 42,477,106	52.05%	$ 35,952,605	45.63%	$ 150,185,161	55.45%
Net Plant		$ 39,130,507	47.95%	$ 42,830,726	54.37%	$ 120,641,262	44.55%
Final Retirement Year		2031		2031		2022	
Average Remaining Life (nearest whole digit)		13		13		4	
Sum of Years Digits Total		91		91		10	
Line	Year	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	430,006	0.53%	470,667	0.60%	12,064,126	4.45%
2	2019	860,011	1.05%	941,335	1.19%	24,128,252	8.91%
3	2020	1,290,017	1.58%	1,412,002	1.79%	36,192,379	13.36%
4	2021	1,720,022	2.11%	1,882,669	2.39%	48,256,505	17.82%
5	2022	2,150,028	2.63%	2,353,337	2.99%		
6	2023	2,580,033	3.16%	2,824,004	3.58%		
7	2024	3,010,039	3.69%	3,294,671	4.18%		
8	2025	3,440,045	4.22%	3,765,339	4.78%		
9	2026	3,870,050	4.74%	4,236,006	5.38%		
10	2027	4,300,056	5.27%	4,706,673	5.97%		
11	2028	4,730,061	5.80%	5,177,341	6.57%		
12	2029	5,160,067	6.32%	5,648,008	7.17%		
13	2030	5,590,072	6.85%	6,118,675	7.77%		
14	2031		7.38%				
15	2032		7.90%				
16	2033		8.43%				
17	2034		8.96%				
18	2035		9.48%				
19	2036		10.01%				
20	2037		10.54%				
21	2038		11.07%				
22	2039		11.59%				
23	2040		12.12%				
24	2041		12.65%				
25	2042		13.17%				
26	2043		13.70%				
27	2044		14.23%				
28	2045		14.75%				
29	2046		15.28%				
30	2047		15.81%				
31	2048		16.33%				
32	2049		16.86%				
33	2050		17.39%				
	Sum of Accrual	$ 39,130,507		$ 42,830,726		$ 120,641,262	
	Beginning Net Plant	$ 39,130,507		$ 42,830,726		$ 120,641,262	
	Difference	$ -		$ -		$ -	

1/ H.W. Sundt Common RL	TEP	WRA
TEP FRY	2065	2048
TEP Remaining Life span	48	31
TEP Average RL	44.59	28.80
TEP Average RL % of Rem Life Span	92.90%	92.90%

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Steam Production Units

Unit		**Springerville Unit 1**		**Springerville Unit 2**		**Springerville Coal Handling**	
Start Year		2018		2018		2018	
Beginning of Year Plant		$ 470,363,217	100.00%	$ 511,557,211	100.00%	$ 183,348,290	100.00%
Beginning of Year Accum Dep		$ 329,201,503	69.99%	$ 176,250,297	34.45%	$ 80,330,345	43.81%
Net Plant		$ 141,161,714	30.01%	$ 335,306,914	65.55%	$ 103,017,945	56.19%
Final Retirement Year		2040		2045		2045	
Average Remaining Life (nearest whole digit)		22		27		27	
Sum of Years Digits Total		253		378		378	
Line	Year	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	557,951	0.12%	887,055	0.17%	272,534	0.15%
2	2019	1,115,903	0.24%	1,774,111	0.35%	545,068	0.30%
3	2020	1,673,854	0.36%	2,661,166	0.52%	817,603	0.45%
4	2021	2,231,806	0.47%	3,548,221	0.69%	1,090,137	0.59%
5	2022	2,789,757	0.59%	4,435,277	0.87%	1,362,671	0.74%
6	2023	3,347,709	0.71%	5,322,332	1.04%	1,635,205	0.89%
7	2024	3,905,660	0.83%	6,209,387	1.21%	1,907,740	1.04%
8	2025	4,463,612	0.95%	7,096,443	1.39%	2,180,274	1.19%
9	2026	5,021,563	1.07%	7,983,498	1.56%	2,452,808	1.34%
10	2027	5,579,514	1.19%	8,870,553	1.73%	2,725,342	1.49%
11	2028	6,137,466	1.30%	9,757,609	1.91%	2,997,877	1.64%
12	2029	6,695,417	1.42%	10,644,664	2.08%	3,270,411	1.78%
13	2030	7,253,369	1.54%	11,531,719	2.25%	3,542,945	1.93%
14	2031	7,811,320	1.66%	12,418,775	2.43%	3,815,479	2.08%
15	2032	8,369,272	1.78%	13,305,830	2.60%	4,088,014	2.23%
16	2033	8,927,223	1.90%	14,192,885	2.77%	4,360,548	2.38%
17	2034	9,485,174	2.02%	15,079,941	2.95%	4,633,082	2.53%
18	2035	10,043,126	2.14%	15,966,996	3.12%	4,905,616	2.68%
19	2036	10,601,077	2.25%	16,854,051	3.29%	5,178,151	2.82%
20	2037	11,159,029	2.37%	17,741,107	3.47%	5,450,685	2.97%
21	2038	11,716,980	2.49%	18,628,162	3.64%	5,723,219	3.12%
22	2039	12,274,932	2.61%	19,515,217	3.81%	5,995,753	3.27%
23	2040			20,402,273	3.99%	6,268,288	3.42%
24	2041			21,289,328	4.16%	6,540,822	3.57%
25	2042			22,176,383	4.34%	6,813,356	3.72%
26	2043			23,063,439	4.51%	7,085,890	3.86%
27	2044			23,950,494	4.68%	7,358,425	4.01%
28	2045						
29	2046						
30	2047						
31	2048						
32	2049						
33	2050						
	Sum of Accrual	$ 141,161,714		$ 335,306,914		$ 103,017,945	
	Beginning Net Plant	$ 141,161,714		$ 335,306,914		$ 103,017,945	
	Difference	$ -		$ -		$ -	

1/ H.W. Sundt Common RL

TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Steam Production Units

Unit		Springerville Common		H.W. Sundt Unit 3		H.W. Sundt Unit 4	
Start Year		2018		2018		2018	
Beginning of Year Plant		$ 313,666,142	100.00%	$ 40,645,958	100.00%	$ 116,902,805	100.00%
Beginning of Year Accum Dep		$ 143,277,989	45.68%	$ 27,011,055	66.45%	$ 62,853,132	53.77%
Net Plant		$ 170,388,153	54.32%	$ 13,634,903	33.55%	$ 54,049,673	46.23%
Final Retirement Year		2045		2032		2037	
Average Remaining Life (nearest whole digit)		27		14		19	
Sum of Years Digits Total		378		105		190	
Line	**Year**	**SOYD RL Expense**	**SOYD Remaining Life Rate**	**SOYD RL Expense**	**SOYD Remaining Life Rate**	**SOYD RL Expense**	**SOYD Remaining Life Rate**
1	2018	450,762	0.14%	129,856	0.32%	284,472	0.24%
2	2019	901,525	0.29%	259,712	0.64%	568,944	0.49%
3	2020	1,352,287	0.43%	389,569	0.96%	853,416	0.73%
4	2021	1,803,049	0.57%	519,425	1.28%	1,137,888	0.97%
5	2022	2,253,812	0.72%	649,281	1.60%	1,422,360	1.22%
6	2023	2,704,574	0.86%	779,137	1.92%	1,706,832	1.46%
7	2024	3,155,336	1.01%	908,994	2.24%	1,991,304	1.70%
8	2025	3,606,098	1.15%	1,038,850	2.56%	2,275,776	1.95%
9	2026	4,056,861	1.29%	1,168,706	2.88%	2,560,248	2.19%
10	2027	4,507,623	1.44%	1,298,562	3.19%	2,844,720	2.43%
11	2028	4,958,385	1.58%	1,428,418	3.51%	3,129,192	2.68%
12	2029	5,409,148	1.72%	1,558,275	3.83%	3,413,664	2.92%
13	2030	5,859,910	1.87%	1,688,131	4.15%	3,698,136	3.16%
14	2031	6,310,672	2.01%	1,817,987	4.47%	3,982,607	3.41%
15	2032	6,761,435	2.16%			4,267,079	3.65%
16	2033	7,212,197	2.30%			4,551,551	3.89%
17	2034	7,662,959	2.44%			4,836,023	4.14%
18	2035	8,113,722	2.59%			5,120,495	4.38%
19	2036	8,564,484	2.73%			5,404,967	4.62%
20	2037	9,015,246	2.87%				
21	2038	9,466,009	3.02%				
22	2039	9,916,771	3.16%				
23	2040	10,367,533	3.31%				
24	2041	10,818,295	3.45%				
25	2042	11,269,058	3.59%				
26	2043	11,719,820	3.74%				
27	2044	12,170,582	3.88%				
28	2045						
29	2046						
30	2047						
31	2048						
32	2049						
33	2050						
	Sum of Accrual	$ 170,388,153		$ 13,634,903		$ 54,049,673	
	Beginning Net Plant	$ 170,388,153		$ 13,634,903		$ 54,049,673	
	Difference	$ -		$ -		$ -	

1/ H.W. Sundt Common RL
TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Steam Production Units

Unit		H.W. Sundt Common	
Start Year		2018	
Beginning of Year Plant		$ 51,037,278	100.00%
Beginning of Year Accum Dep		$ 17,088,806	33.48%
Net Plant		$ 33,948,472	66.52%
Final Retirement Year		2048	
Average Remaining Life (nearest whole digit)		29 1/	
Sum of Years Digits Total		435	

Line	Year	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	78,042	0.15%
2	2019	156,085	0.31%
3	2020	234,127	0.46%
4	2021	312,170	0.61%
5	2022	390,212	0.76%
6	2023	468,255	0.92%
7	2024	546,297	1.07%
8	2025	624,340	1.22%
9	2026	702,382	1.38%
10	2027	780,425	1.53%
11	2028	858,467	1.68%
12	2029	936,510	1.83%
13	2030	1,014,552	1.99%
14	2031	1,092,595	2.14%
15	2032	1,170,637	2.29%
16	2033	1,248,679	2.45%
17	2034	1,326,722	2.60%
18	2035	1,404,764	2.75%
19	2036	1,482,807	2.91%
20	2037	1,560,849	3.06%
21	2038	1,638,892	3.21%
22	2039	1,716,934	3.36%
23	2040	1,794,977	3.52%
24	2041	1,873,019	3.67%
25	2042	1,951,062	3.82%
26	2043	2,029,104	3.98%
27	2044	2,107,147	4.13%
28	2045	2,185,189	4.28%
29	2046	2,263,231	4.43%
30	2047		
31	2048		
32	2049		
33	2050		
	Sum of Accrual	$ 33,948,472	
	Beginning Net Plant	$ 33,948,472	
	Difference	$ -	

1/ H.W. Sundt Common RL See p. 1 of 4

TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Other Production Units

Unit		DeMoss Petrie CTs Unit 1		Gila River Unit 3		Gila River Common	
Start Year		2018		2018		2018	
Beginning of Year Plant		$ 33,920,195	100.00%	$ 232,106,276	100.00%	$ 29,788,935	100.00%
Beginning of Year Accum Dep		$ 13,788,463	40.65%	$ 100,143,313	43.15%	$ 8,699,866	29.21%
Net Plant		$ 20,131,732	59.35%	$ 131,962,963	56.85%	$ 21,089,069	70.79%
Final Retirement Year		2046		2048		2048	
Average Remaining Life (nearest whole digit)		27		29 1/		29 1/	
Sum of Years Digits Total		378		435		435	
Line	Year	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	53,259	0.16%	303,363	0.13%	48,481	0.16%
2	2019	106,517	0.31%	606,726	0.26%	96,961	0.33%
3	2020	159,776	0.47%	910,089	0.39%	145,442	0.49%
4	2021	213,034	0.63%	1,213,453	0.52%	193,922	0.65%
5	2022	266,293	0.79%	1,516,816	0.65%	242,403	0.81%
6	2023	319,551	0.94%	1,820,179	0.78%	290,884	0.98%
7	2024	372,810	1.10%	2,123,542	0.91%	339,364	1.14%
8	2025	426,068	1.26%	2,426,905	1.05%	387,845	1.30%
9	2026	479,327	1.41%	2,730,268	1.18%	436,326	1.46%
10	2027	532,586	1.57%	3,033,631	1.31%	484,806	1.63%
11	2028	585,844	1.73%	3,336,994	1.44%	533,287	1.79%
12	2029	639,103	1.88%	3,640,358	1.57%	581,767	1.95%
13	2030	692,361	2.04%	3,943,721	1.70%	630,248	2.12%
14	2031	745,620	2.20%	4,247,084	1.83%	678,729	2.28%
15	2032	798,878	2.36%	4,550,447	1.96%	727,209	2.44%
16	2033	852,137	2.51%	4,853,810	2.09%	775,690	2.60%
17	2034	905,395	2.67%	5,157,173	2.22%	824,171	2.77%
18	2035	958,654	2.83%	5,460,536	2.35%	872,651	2.93%
19	2036	1,011,912	2.98%	5,763,900	2.48%	921,132	3.09%
20	2037	1,065,171	3.14%	6,067,263	2.61%	969,612	3.25%
21	2038	1,118,430	3.30%	6,370,626	2.74%	1,018,093	3.42%
22	2039	1,171,688	3.45%	6,673,989	2.88%	1,066,574	3.58%
23	2040	1,224,947	3.61%	6,977,352	3.01%	1,115,054	3.74%
24	2041	1,278,205	3.77%	7,280,715	3.14%	1,163,535	3.91%
25	2042	1,331,464	3.93%	7,584,078	3.27%	1,212,015	4.07%
26	2043	1,384,722	4.08%	7,887,441	3.40%	1,260,496	4.23%
27	2044	1,437,981	4.24%	8,190,805	3.53%	1,308,977	4.39%
28				8,494,168	3.66%	1,357,457	4.56%
29				8,797,531	3.79%	1,405,938	4.72%
30				9,100,894	3.92%	1,454,419	4.88%
31				9,404,257	4.05%	1,502,899	5.05%
32							
33							
	Sum of Accrual	$ 20,131,732		$ 150,468,114		$ 24,046,387	
	Beginning Net Plant	$ 20,131,732		$ 131,962,963		$ 21,089,069	
	Difference	$ -		$ 18,505,151		$ 2,957,318	

1/ TEP v. WRA RLs	Gila 3	Gila Common	Luna	Sundt 1	Sundt 2
TEP					
TEP FRY	2063	2063	2066	2032	
TEP Remaining Life span	46	46	49	15	-2016
TEP Average RL	42.83	42.83	45.49	14.23	
TEP Average RL % of Rem Life Span	93.11%	93.11%	92.84%	94.87%	0.00%
SKM					
SKM FRY	2048	2048	2051	2027	
SKM Remaining Life span	31	31	34	10	
SKM Average RL	28.86	28.86	31.56	9.49	
SKM Average RL % of Rem Life Span	93.11%	93.11%	92.84%	94.87%	
	29	29	32	9	

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Other Production Units

Unit		Luna Energy Facility		North Loop CTs Unit 1		North Loop CTs Unit 2	
Start Year		2018		2018		2018	
Beginning of Year Plant		$ 53,483,210	100.00%	$ 2,804,400	100.00%	$ 4,687,062	100.00%
Beginning of Year Accum Dep		$ 3,171,371	5.93%	$ 6,357,702	226.70%	$ 4,866,232	103.82%
Net Plant		$ 50,311,839	94.07%	$ (3,553,302)	-126.70%	$ (179,170)	-3.82%
Final Retirement Year		2051		2027		2027	
Average Remaining Life (nearest whole digit)		32 1/		11		11	
				Overdepreciated Stop Depreciation		Overdepreciated Stop Depreciation	
Sum of Years Digits Total		528					
Line	Year	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	95,288	0.18%	-	0.00%	-	0.00%
2	2019	190,575	0.36%	-	0.00%	-	0.00%
3	2020	285,863	0.53%	-	0.00%	-	0.00%
4	2021	381,150	0.71%	-	0.00%	-	0.00%
5	2022	476,438	0.89%	-	0.00%	-	0.00%
6	2023	571,725	1.07%	-	0.00%	-	0.00%
7	2024	667,013	1.25%	-	0.00%	-	0.00%
8	2025	762,301	1.43%	-	0.00%	-	0.00%
9	2026	857,588	1.60%	-	0.00%	-	0.00%
10	2027	952,876	1.78%	-	0.00%	-	0.00%
11	2028	1,048,163	1.96%	-	0.00%	-	0.00%
12	2029	1,143,451	2.14%				
13	2030	1,238,738	2.32%				
14	2031	1,334,026	2.49%				
15	2032	1,429,314	2.67%				
16	2033	1,524,601	2.85%				
17	2034	1,619,889	3.03%				
18	2035	1,715,176	3.21%				
19	2036	1,810,464	3.39%				
20	2037	1,905,751	3.56%				
21	2038	2,001,039	3.74%				
22	2039	2,096,327	3.92%				
23	2040	2,191,614	4.10%				
24	2041	2,286,902	4.28%				
25	2042	2,382,189	4.45%				
26	2043	2,477,477	4.63%				
27	2044	2,572,764	4.81%				
28		2,668,052	4.99%				
29		2,763,340	5.17%				
30		2,858,627	5.34%				
31		2,953,915	5.52%				
32		3,049,202	5.70%				
33							
	Sum of Accrual	$ 50,311,839		$ -		$ -	
	Beginning Net Plant	$ 50,311,839		$ (3,553,302)		$ (179,170)	
	Difference	$ -		$ 3,553,302		$ 179,170	

1/ TEP v. WRA RLs

TEP

TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

SKM

SKM FRY
SKM Remaining Life span
SKM Average RL
SKM Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Other Production Units

Unit	North Loop CTs Unit 3		North Loop CTs Unit 4		H.W. Sundt CT Unit 1	
Start Year	2018		2018		2018	
Beginning of Year Plant	$ 4,843,216	100.00%	$ 15,809,311	100.00%	$ 7,142,589	100.00%
Beginning of Year Accum Dep	$ 5,233,368	108.06%	$ 6,435,078	40.70%	$ 5,320,009	74.48%
Net Plant	$ (390,152)	-8.06%	$ 9,374,233	59.30%	$ 1,822,580	25.52%
Final Retirement Year	2027		2046		2027	
Average Remaining Life (nearest whole digit)	11		27		9 1/	
Sum of Years Digits Total	Overdepreciated Stop Depreciation		378		45	

Line	Year	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	-	0.00%	24,800	0.16%	40,502	0.57%
2	2019	-	0.00%	49,599	0.31%	81,004	1.13%
3	2020	-	0.00%	74,399	0.47%	121,505	1.70%
4	2021	-	0.00%	99,198	0.63%	162,007	2.27%
5	2022	-	0.00%	123,998	0.78%	202,509	2.84%
6	2023	-	0.00%	148,797	0.94%	243,011	3.40%
7	2024	-	0.00%	173,597	1.10%	283,512	3.97%
8	2025	-	0.00%	198,396	1.25%	324,014	4.54%
9	2026	-	0.00%	223,196	1.41%	364,516	5.10%
10	2027	-	0.00%	247,996	1.57%		
11	2028	-	0.00%	272,795	1.73%		
12	2029			297,595	1.88%		
13	2030			322,394	2.04%		
14	2031			347,194	2.20%		
15	2032			371,993	2.35%		
16	2033			396,793	2.51%		
17	2034			421,592	2.67%		
18	2035			446,392	2.82%		
19	2036			471,192	2.98%		
20	2037			495,991	3.14%		
21	2038			520,791	3.29%		
22	2039			545,590	3.45%		
23	2040			570,390	3.61%		
24	2041			595,189	3.76%		
25	2042			619,989	3.92%		
26	2043			644,789	4.08%		
27	2044			669,588	4.24%		
28							
29							
30							
31							
32							
33							
	Sum of Accrual	$ -		$ 9,374,233		$ 1,822,580	
	Beginning Net Plant	$ (390,152)		$ 9,374,233		$ 1,822,580	
	Difference	$ 390,152		$ -		$ -	

1/ TEP v. WRA RLs

TEP

TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

SKM

SKM FRY
SKM Remaining Life span
SKM Average RL
SKM Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Other Production Units

		H.W. Sundt CT Unit 2	
Unit		**H.W. Sundt CT Unit 2**	
Start Year		2018	
Beginning of Year Plant		$ 7,570,251	100.00%
Beginning of Year Accum Dep		$ 4,991,639	65.94%
Net Plant		$ 2,578,612	34.06%
Final Retirement Year		2027	
Average Remaining Life (nearest whole digit)		9	1/
Sum of Years Digits Total		45	

Line	Year	SOYD RL Expense	SOYD Remaining Life Rate
1	2018	57,302	0.76%
2	2019	114,605	1.51%
3	2020	171,907	2.27%
4	2021	229,210	3.03%
5	2022	286,512	3.78%
6	2023	343,815	4.54%
7	2024	401,117	5.30%
8	2025	458,420	6.06%
9	2026	515,722	6.81%
10	2027		
11	2028		
12	2029		
13	2030		
14	2031		
15	2032		
16	2033		
17	2034		
18	2035		
19	2036		
20	2037		
21	2038		
22	2039		
23	2040		
24	2041		
25	2042		
26	2043		
27	2044		
28			
29			
30			
31			
32			
33			
	Sum of Accrual	$ 2,578,612	
	Beginning Net Plant	$ 2,578,612	
	Difference	$ -	

1/ TEP v. WRA RLs

TEP

TEP FRY
TEP Remaining Life span
TEP Average RL
TEP Average RL % of Rem Life Span

SKM

SKM FRY
SKM Remaining Life span
SKM Average RL
SKM Average RL % of Rem Life Span

Tucson Electric Power Company
Snavely King Majoros & Associates, Inc.
RL SOYD Depreciation Rates
Gila River Unit 2

Exhibit___(MJM-6)

Unit	Gila River Unit 2	
Start Year	2019	
Beginning of Year Plant	$ 312,010,045	100.00%
Beginning of Year Accum Dep	$ 172,485,563	55.28%
Net Plant	$ 139,524,482	44.72%
Final Retirement Year	2050	
Average Remaining Life (nearest whole digit)	30	
Sum of Years Digits Total	465	

Line	Year	SOYD RL Expense	SOYD Remaining Life Rate
1	2019	300,053	0.10%
2	2020	600,105	0.19%
3	2021	900,158	0.29%
4	2022	1,200,211	0.38%
5	2023	1,500,263	0.48%
6	2024	1,800,316	0.58%
7	2025	2,100,369	0.67%
8	2026	2,400,421	0.77%
9	2027	2,700,474	0.87%
10	2028	3,000,526	0.96%
11	2029	3,300,579	1.06%
12	2030	3,600,632	1.15%
13	2031	3,900,684	1.25%
14	2032	4,200,737	1.35%
15	2033	4,500,790	1.44%
16	2034	4,800,842	1.54%
17	2035	5,100,895	1.63%
18	2036	5,400,948	1.73%
19	2037	5,701,000	1.83%
20	2038	6,001,053	1.92%
21	2039	6,301,106	2.02%
22	2040	6,601,158	2.12%
23	2041	6,901,211	2.21%
24	2042	7,201,264	2.31%
25	2043	7,501,316	2.40%
26	2044	7,801,369	2.50%
27	2045	8,101,422	2.60%
28	2046	8,401,474	2.69%
29	2047	8,701,527	2.79%
30	2048	9,001,579	2.89%
	Sum of Accrual	$ 139,524,482	
	Beginning Net Plant	$ 139,524,482	
	Difference	$ -	

TUCSON ELECTRIC POWER COMPANY White
Snavely King Majoros & Associates, Inc.
Future Net Salvage
Steam and Other Production (non-solar)

Exhibit___(MJM-7)
1

Account Description A	December 31,2017 Plant Investment B	Future Retirements Interim C	Net Salvage Rate Interim D	Future Net Salvage Interim E=C*D	Future Net Salvage Ratio F=E/B
STEAM PRODUCTION (by Unit)					
Four Corners					
310 Land and Water Rights	0	0	0.00%	$-	
311 Structures and Improvements	4,919,557	165,522	-10.00%	(16,552)	-0.34%
312 Boiler Plant Equipment	130,921,577	4,446,193	-5.00%	(222,310)	-0.17%
314 Turbogenerator Units	13,465,869	464,261	-5.00%	(23,213)	-0.17%
315 Accessory Electric Equipment	6,052,719	201,735	-5.00%	(10,087)	-0.17%
316 Miscellaneous Power Plant Equipment	5,031,222	169,231	-5.00%	(8,462)	-0.17%
Total Four Corners	160,390,944	5,446,942	-5.152%	(280,624)	-0.17%
Four Corners Unit 4					
310 Land and Water Rights	$-	$-	0.00%	$-	
311 Structures and Improvements	2,536,878	85,320	-10.00%	(8,532)	-0.34%
312 Boiler Plant Equipment	66,328,076	2,256,625	-5.00%	(112,831)	-0.17%
314 Turbogenerator Units	7,301,161	252,452	-5.00%	(12,623)	-0.17%
315 Accessory Electric Equipment	2,942,419	98,287	-5.00%	(4,914)	-0.17%
316 Miscellaneous Power Plant Equipment	2,499,079	84,092	-5.00%	(4,205)	-0.17%
Total Four Corners Unit 4	81,607,613	2,776,776	-5.154%	(143,105)	-0.18%
Four Corners Unit 5					
310 Land and Water Rights	$-	$-	0.00%	$-	
311 Structures and Improvements	2,382,679	80,203	-10.00%	(8,020)	-0.34%
312 Boiler Plant Equipment	64,593,501	2,189,568	-5.00%	(109,478)	-0.17%
314 Turbogenerator Units	6,164,708	211,809	-5.00%	(10,590)	-0.17%
315 Accessory Electric Equipment	3,110,300	103,448	-5.00%	(5,172)	-0.17%
316 Miscellaneous Power Plant Equipment	2,532,143	85,139	-5.00%	(4,257)	-0.17%
Total Four Corners Unit 5	78,783,331	2,670,167	-5.150%	(137,519)	-0.17%
San Juan Station					
310 Land and Water Rights	$-	$-	0.00%	$-	
311 Structures and Improvements	15,139,759	162,814	-10.00%	(16,281)	-0.11%
312 Boiler Plant Equipment	194,548,054	2,036,053	-5.00%	(101,803)	-0.05%
314 Turbogenerator Units	45,176,354	482,915	-5.00%	(24,146)	-0.05%
315 Accessory Electric Equipment	13,737,497	143,793	-5.00%	(7,190)	-0.05%
316 Miscellaneous Power Plant Equipment	2,224,759	23,573	-5.00%	(1,179)	-0.05%
Total San Juan Station	270,826,423	2,849,148	-5.29%	(150,598)	-0.06%

TUCSON ELECTRIC POWER COMPANY White
Snavely King Majoros & Associates, Inc.
Future Net Salvage
Steam and Other Production (non-solar)

Account Description A	December 31,2017 Plant Investment B	Future Retirements Interim C	Net Salvage Rate Interim D	Future Net Salvage Interim E=C*D	Future Net Salvage Rato F=E/B
Springerville					
310 Land and Water Rights	13,491,604	941,544		$-	
311 Structures and Improvements	251,632,743	17,691,296	-10.00%	(1,769,130)	-0.70%
312 Boiler Plant Equipment	854,532,455	57,355,414	-5.00%	(2,867,771)	-0.34%
314 Turbogenerator Units	216,375,722	14,276,555	-5.00%	(713,828)	-0.33%
315 Accessory Electric Equipment	123,609,405	8,435,710	-5.00%	(421,786)	-0.34%
316 Miscellaneous Power Plant Equipment	19,292,931	1,325,614	-5.00%	(66,281)	-0.34%
Total Springerville	1,478,934,860	100,026,133	-5.84%	(5,838,794)	-0.39%
Springerville Unit 1					
310 Land and Water Rights	$-	$-		$-	
311 Structures and Improvements	31,924,715	1,897,242	-10.00%	(189,724)	-0.59%
312 Boiler Plant Equipment	303,017,947	17,921,595	-5.00%	(896,080)	-0.30%
314 Turbogenerator Units	88,337,936	5,222,897	-5.00%	(261,145)	-0.30%
315 Accessory Electric Equipment	42,519,110	2,535,082	-5.00%	(126,754)	-0.30%
316 Miscellaneous Power Plant Equipment	4,563,509	272,768	-5.00%	(13,638)	-0.30%
Total Springerville Unit 1	470,363,217	27,849,584	-5.34%	(1,487,341)	-0.32%
Springerville Unit 2					
310 Land and Water Rights	$-	$-		$-	
311 Structures and Improvements	33,722,554	2,405,204	-10.00%	(240,520)	-0.71%
312 Boiler Plant Equipment	308,084,331	21,896,186	-5.00%	(1,094,809)	-0.36%
314 Turbogenerator Units	122,080,175	8,630,498	-5.00%	(431,525)	-0.35%
315 Accessory Electric Equipment	42,118,251	3,041,664	-5.00%	(152,083)	-0.36%
316 Miscellaneous Power Plant Equipment	5,551,900	398,240	-5.00%	(19,912)	-0.36%
Total Springerville Unit 2	511,557,211	36,371,792	-5.33%	(1,938,850)	-0.38%
Springerville Coal Handling					
310 Land and Water Rights	2,200,016	162,075		$-	
311 Structures and Improvements	7,419,494	528,606	-10.00%	(52,861)	-0.71%
312 Boiler Plant Equipment	162,870,423	11,812,289	-5.00%	(590,614)	-0.36%
314 Turbogenerator Units					
315 Accessory Electric Equipment	9,746,258	715,901	-5.00%	(35,795)	-0.37%
316 Miscellaneous Power Plant Equipment	1,112,099	77,197	-5.00%	(3,860)	-0.35%
Total Springerville Coal Handling	183,348,290	13,296,068	-5.14%	(683,130)	-0.37%
Springerville Common					
310 Land and Water Rights	11,291,588	779,469		$-	
311 Structures and Improvements	178,565,980	12,860,244	-10.00%	(1,286,024)	-0.72%
312 Boiler Plant Equipment	80,559,754	5,725,344	-5.00%	(286,267)	-0.36%
314 Turbogenerator Units	5,957,611	423,160	-5.00%	(21,158)	-0.36%
315 Accessory Electric Equipment	29,225,786	2,143,064	-5.00%	(107,153)	-0.37%
316 Miscellaneous Power Plant Equipment	8,065,423	577,410	-5.00%	(28,871)	-0.36%
Total Springerville Common	313,666,142	22,508,691	-7.68%	(1,729,473)	-0.55%

TUCSON ELECTRIC POWER COMPANY
Snavely King Majoros & Associates, Inc.
Comparison of TEP VG/RL and SKM RL SOYD Proposed Accruals and Rates
Gila River Unit 2
2019 Annualized Rates

Exhibit___(MJM-10)

→
←

			TEP				SKM RL SOYD Rates				Comparison		
			Proposed				Proposed						
	Account Description	Plant Balance December 31, 2018	Rem. Life	Net Salvage	Reserve Ratio	Accrual Rate	Rem. Life	Net Salvage	Reserve Ratio	SOYD Accrual Rate 2019	TEP Accrual	SKM Accrual	Difference
	A	B	C	D	E	F	G	H	I	J	K	L	M
Gila River Unit 2													
341.00	Structures and Improvements	$ 2,621,733	24.08	-16.6%	47.61%	1.63%	30			0.10%	42,734	2,622	(40,113)
342.00	Fuel Holders, Products and Accessories	247,911	16.02	-7.2%	50.07%	1.09%	30			0.10%	2,702	248	(2,454)
343.00	Prime Movers	251,751,223	18.34	-5.6%	51.04%	1.10%	30			0.10%	2,769,263	251,751	(2,517,512)
344.00	Generators and Devices	44,287,327	18.19	-9.1%	54.64%	0.98%	30			0.10%	434,016	44,287	(389,728)
345.00	Accessory Electric Equipment	11,261,566	20.07	-12.1%	48.06%	1.22%	30			0.10%	137,391	11,262	(126,130)
346.00	Miscellaneous Power Plant Equipment	1,840,285	17.56	-8.6%	49.99%	0.99%	30			0.10%	18,219	1,840	(16,379)
Total Gila River Unit 2		$ 312,010,045	41.94	-1.1%	0.00%	1.09%	30			0.10%	3,404,326	312,010	(3,092,316)